



Mac OS X: State of the Union

Session 000





Directions for the Platform

Bertrand Serlet
VP, Platform Technologies

Maslow: Human Needs



Maslow: Human Needs

A pyramid diagram representing Maslow's hierarchy of needs. The pyramid is divided into four horizontal sections. The top section is blue with white clouds and contains the text 'Self-Actualization'. The second section is a light blue-grey and contains 'Esteem'. The third section is a darker grey and contains 'Belonging' and 'Safety'. The bottom section is the darkest grey and contains 'Physiological'. The background of the pyramid is a landscape with sand dunes and mountains under a blue sky.

**Self-
Actualization**

Esteem

Belonging

Safety

Physiological



Apple's Challenges

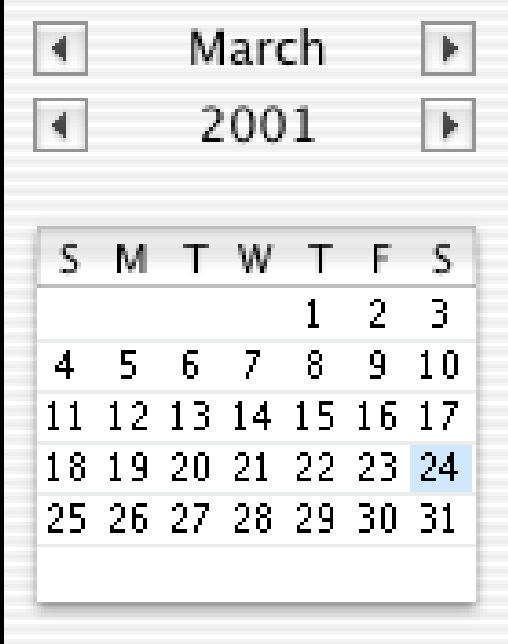


Apple's Challenges



Define a SW strategy





Ship Mac OS X
Define a SW strategy



WWDC 2001

What is Mac OS X?



WWDC 2001

What is Mac OS X?

Call for action:

Need Apps!



One Year Later . . .

> 3,000 Apps!



One Year Later . . .

Thank you!



We Worked Hard, Too

- Mac OS X 10.1 Six months after
- 10.1.1, 10.1.2, 10.1.3, 10.1.4
- New X-only apps (iPhoto)
- Security updates

= > Default on all new Macs





Default on HW

10.1

Ship Mac OS X

Define a SW strategy



New Challenges

**Innovation
Continual
Improvement**

Default on HW

10.1

Ship Mac OS X

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New Challenges

**Innovation
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Default on HW

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Ship Mac OS X

Define a SW strategy



Where We Are Headed

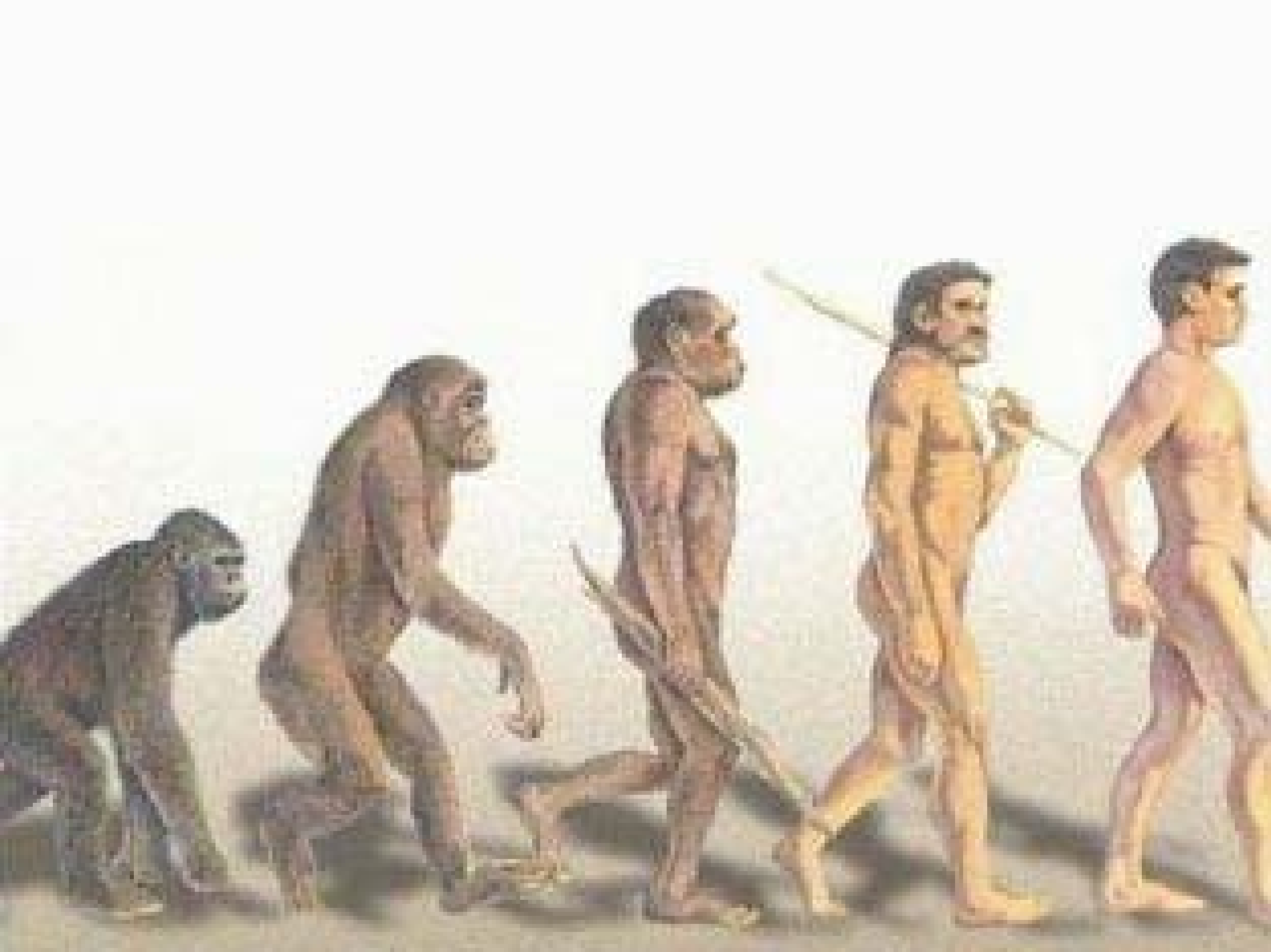
- 1 Evolution
- 2 Revolution
- 3 Unix
- 4 Frameworks



Where We Are Headed

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Evolution

- Software is like wine:
 - Age it!
 - Start with good grapes

We are committed to
maturing Mac OS X



Continued, Incremental Improvements

- UI
- Architecture
- API
- Security
- Functionality



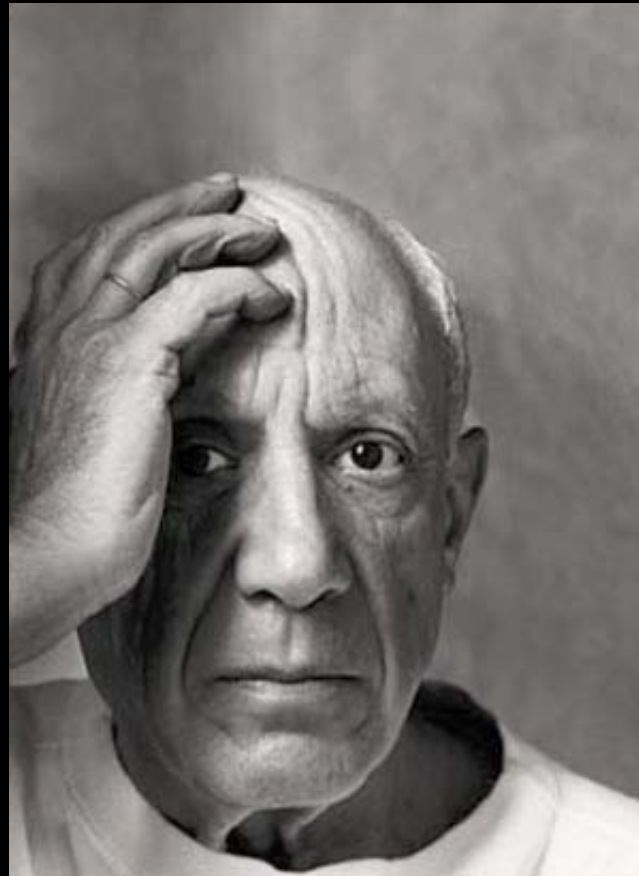
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Evolution: UI

Step 1—Creative Genius

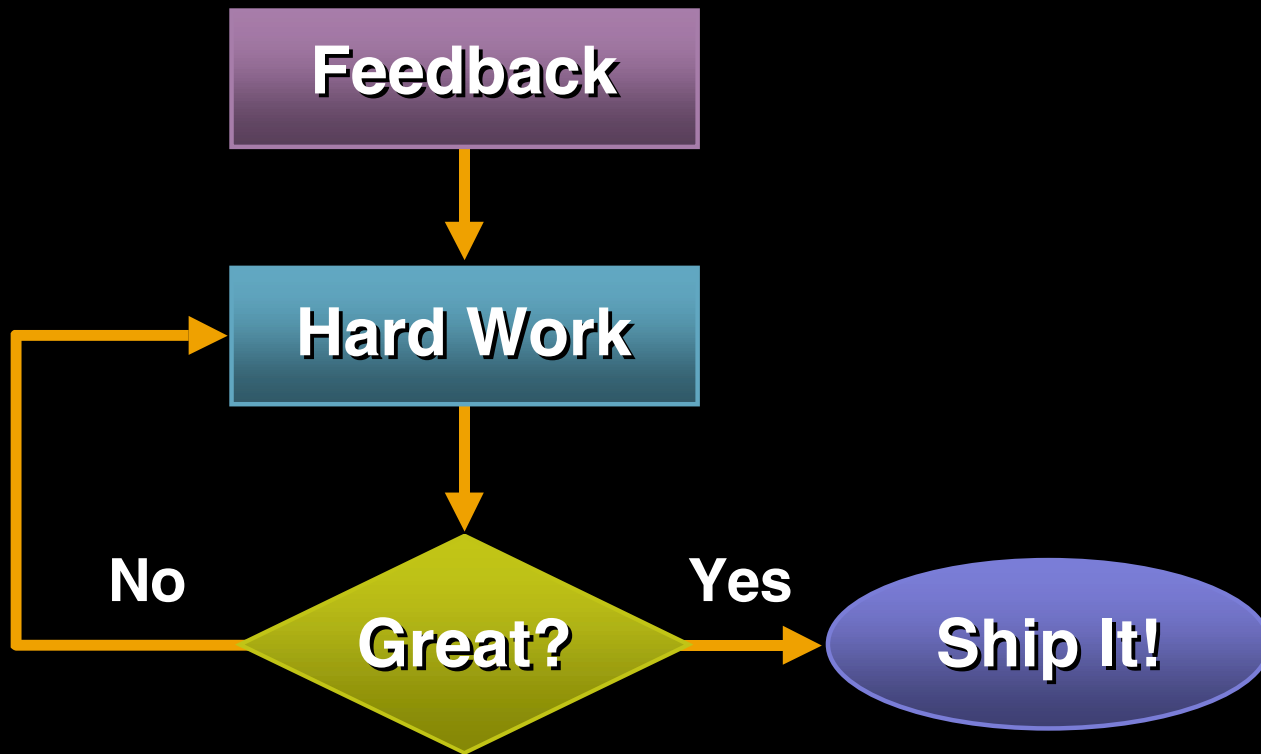


Evolution: UI

Step 2—Big Show



Evolution: UI (More Pedestrian)



Example of UI Problem

- On <DVD insert> launch DVD Player
- On <iPod insert> launch iTunes
- No control UI





System Preferences



Show All



Displays



Sound



Network



Startup Disk



International



Login



Screen Saver

Personal



Desktop



Dock



General



International



Login



Screen Saver



Universal
Access

Digital Hub



Burn



Disks



Music



Photography



Video

Hardware



ColorSync



Displays



Energy Saver



Keyboard



Mouse



Sound

Internet & Network



Internet



Network



QuickTime



Sharing

System



Classic



Date & Time



Software
Update



Speech

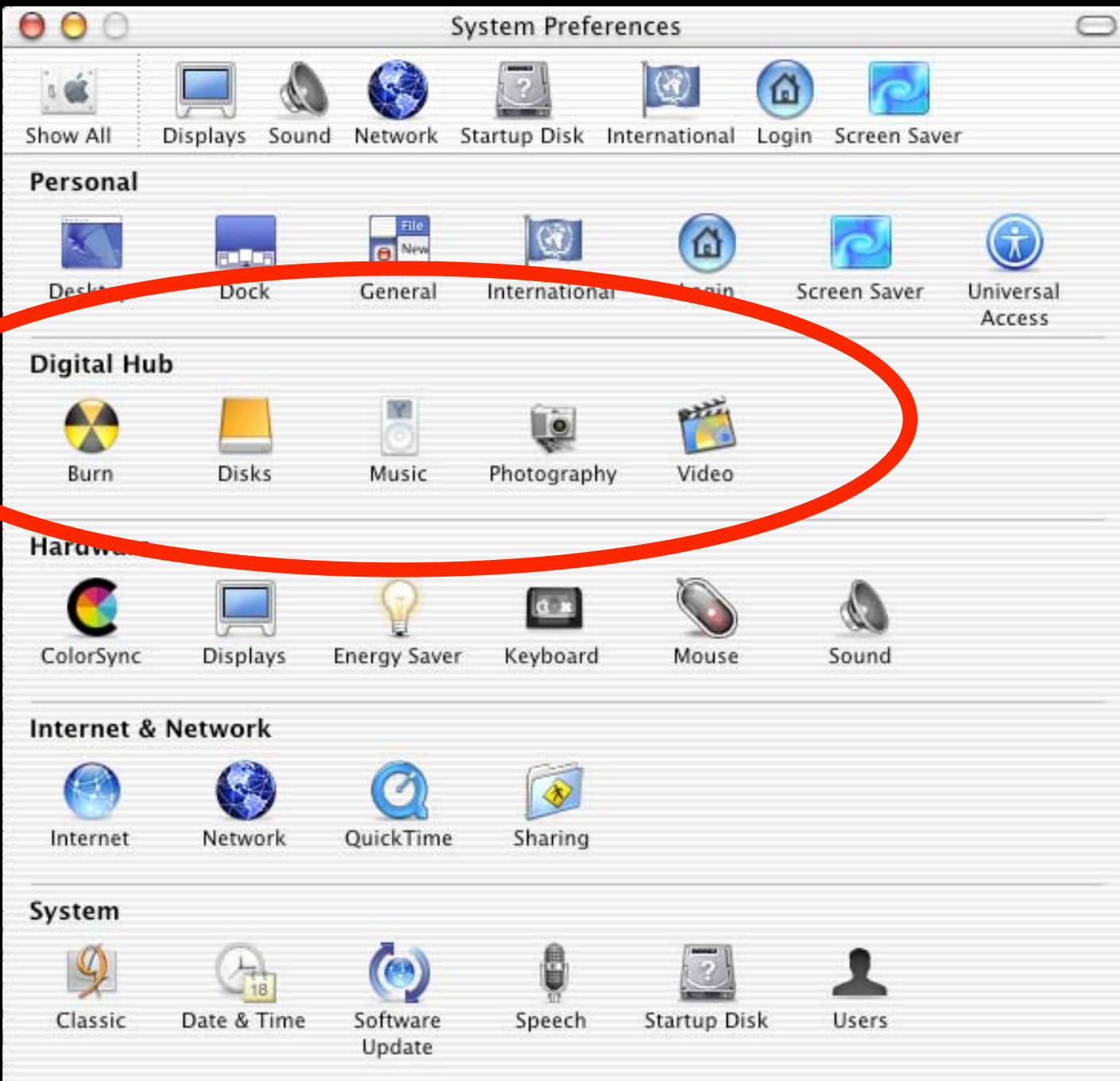


Startup Disk



Users





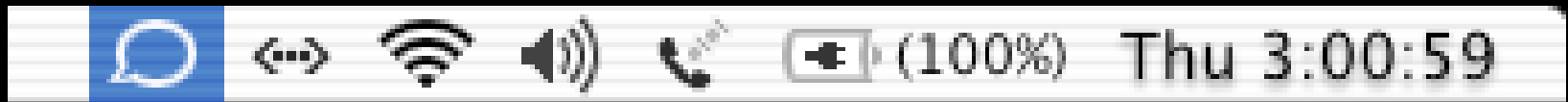
Digital Hub Panels

- Generalize:
 - On <event> do <action>
- Architect:
 - Set up UI in Preferences
 - Event driven
 - Need to use daemon



Digital Hub Panels

- Reuse “System UI Server”



Continued, Incremental Improvements

- UI
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- Security
- Functionality



Evolution: Architecture

- Solve a real need
- Don't rush; think
 - What is the right place?
- Design
- Implement
- Propagate
- Publish API



Continued, Incremental Improvements


- UI
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Evolution: API

APIs are at the core of what we do

API



**Bad APIs limit
our capacity to innovate!**

Bad API anyway No API **Iterate on API**



Evolution: API

- Develop culture of high-quality APIs
- Ideal API lifecycle
 - Start as SPI
 - Use in several places; iterate
 - Internal review; iterate
 - Your feedback; iterate
- Focus on blockers (vs. goodie)

Lots of new APIs in Jaguar



Continued, Incremental Improvements

- UI
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Evolution: Security

- Quiet but very aware
- **Constantly** look for and fix potential vulnerabilities
 - Monitor CERT advisories
 - Monitor web, distribution lists
 - Tight relationships with *BSD
- SW Updates



New Security Features

- New APIs
 - Certificates
 - Kerberos
- User features
 - KeyChain + Authorization adoption
 - Encrypted disk images
 - Smart Cards
 - Firewall



Evolution: Security

- Firewall
 - Shipping since 10.0
 - Finally with UI





System Preferences



- Show All
- Displays
- Sound
- Network
- Startup Disk
- International
- Login
- Screen Saver

Personal

- Desktop
- Dock
- General
- International
- Login
- Screen Saver
- Universal Access

Digital Hub

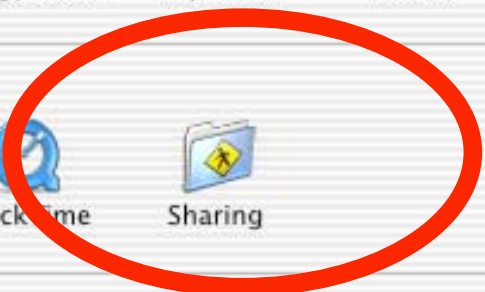
- Burn
- Disks
- Music
- Photography
- Video

Hardware

- ColorSync
- Displays
- Energy Saver
- Keyboard
- Mouse
- Sound

Internet & Network

- Internet
- Network
- QuickTime
- Sharing



System

- Classic
- Date & Time
- Software Update
- Speech
- Startup Disk
- Users



FireWall

The screenshot shows the 'Sharing' window in Mac OS X. The 'Firewall' tab is selected, showing the 'Firewall On' status. A 'Stop' button is available to allow incoming network communication. A list of services is shown with checkboxes for allowing them through the firewall. The services listed are: Personal Web Sharing (80, 427), Remote Login - SSH (22), FTP Access (20-21 or 1024-65535 from 20-21), Remote Apple Events (3031), and Printer Sharing (631). The 'Remote Login - SSH' and 'Printer Sharing' services are checked. There are 'New...', 'Edit...', and 'Delete' buttons to the right of the list. A note at the bottom explains that passive FTP mode should be enabled in the Proxies tab. A lock icon at the bottom left indicates that the settings are locked.

Sharing

Show All Displays Sound Network Startup Disk

Computer Name: Ordinateur de Bertrand Serlet
Used for File Sharing, AppleTalk, and SLP file servers
Local Hostname: Ordinateur-de-Bertrand-Serlet.local.arpa

Network Address: serlbe2.apple.com
Used for Web Sharing, FTP, and other IP-based services [Edit...](#)

(in Network Preferences)

Services **Firewall**

Firewall On

[Stop](#) Click Stop to allow incoming network communication to all services and ports.

Allow:

On	Description (Ports)
<input type="checkbox"/>	Personal Web Sharing (80, 427)
<input checked="" type="checkbox"/>	Remote Login - SSH (22)
<input type="checkbox"/>	FTP Access (20-21 or 1024-65535 from 20-21)
<input type="checkbox"/>	Remote Apple Events (3031)
<input checked="" type="checkbox"/>	Printer Sharing (631)

[New...](#)
[Edit...](#)
[Delete](#)

To use FTP to retrieve files while the firewall is on, enable passive FTP mode using the Proxies tab in Network Preferences.

Click the lock to prevent further changes.



Evolution: Security

- Security frameworks
- Common Data Security Architecture
 - Robust
 - Extensive
 - Extensible
 - Open Group standard



Continued, Incremental Improvements

- UI
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Evolution: Functionality

- Of course, more user functionality

Challenge:

Increase breadth, retain simplicity

Less code for apps

- Simplify user model
- Progressive discovery
- Frameworks



Continued, Incremental Improvements

- UI
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Evolution

- Across board
- Performance
- Polish—annoying nits
- API—little additions
- Your feedback is key



Where We Are Headed

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Where We Are Headed

1

Evolution

2

Revolution

3

Unix

4

Frameworks







SOLIDARNOŚĆ



Revolutionary Trends (Smaller Scale)

- Apple leading edge of technology
- Industry-wide trends



Intelligent Gadgets Everywhere



Intelligent Gadgets Everywhere

Technology implications?



Intelligent Gadgets Everywhere

Technology implications?

- Threading
- Event-driven
- IOKit
- Multihoming
- Rich Networking
- BlueTooth
- vecLib
- CoreFoundation
- CFNetwork
- QuickTime
- Rapid Dev
- Cocoa



Café Computing



Café Computing

- Portables: growing segment
- Airport / WiFi / 802.11
- Mobility —Power Management



Ad Hoc Networking

When nobody manages the network



Ad Hoc Networking

- Problem:
 - Auto-discovery of neighbors
 - Human-readable names
 - Compatible with usual networking



Solution: AppleTalk ?



- + Dynamic discovery
- + Use plain-English names
- Non standard
- Rejected by IS depts



AppleTalk—RIP

TCP/IP is THE standard



Rendezvous



Rendezvous
aka Zero Config
aka ZeroConf



Rendezvous

Dynamic discovery over TCP/IP

- Compatible with existing protocols
- Compatible with existing clients
- A new way to use DNS
- IETF Standard: in progress



Rendezvous

How does it work?

1. lookup("printers")
 - = > "Stuart's Printer"
 - = > "Brett's Printer"
2. lookup("Stuart's Printer")
 - = > 123.45.67.89



Usage

- Defined conventions and policies
- APIs
 - System framework
 - CoreFoundation
 - Foundation
- iTunes, FS, Printing, . . .
- Your apps!



B2B

C2B

P2P

B2C



P2P



P2P:
People To People



P2P: Mail



Demo Account — On My Mac

Delete Reply All Forward Compose Mailbox Get Mail Search Demo Account Mark Junk

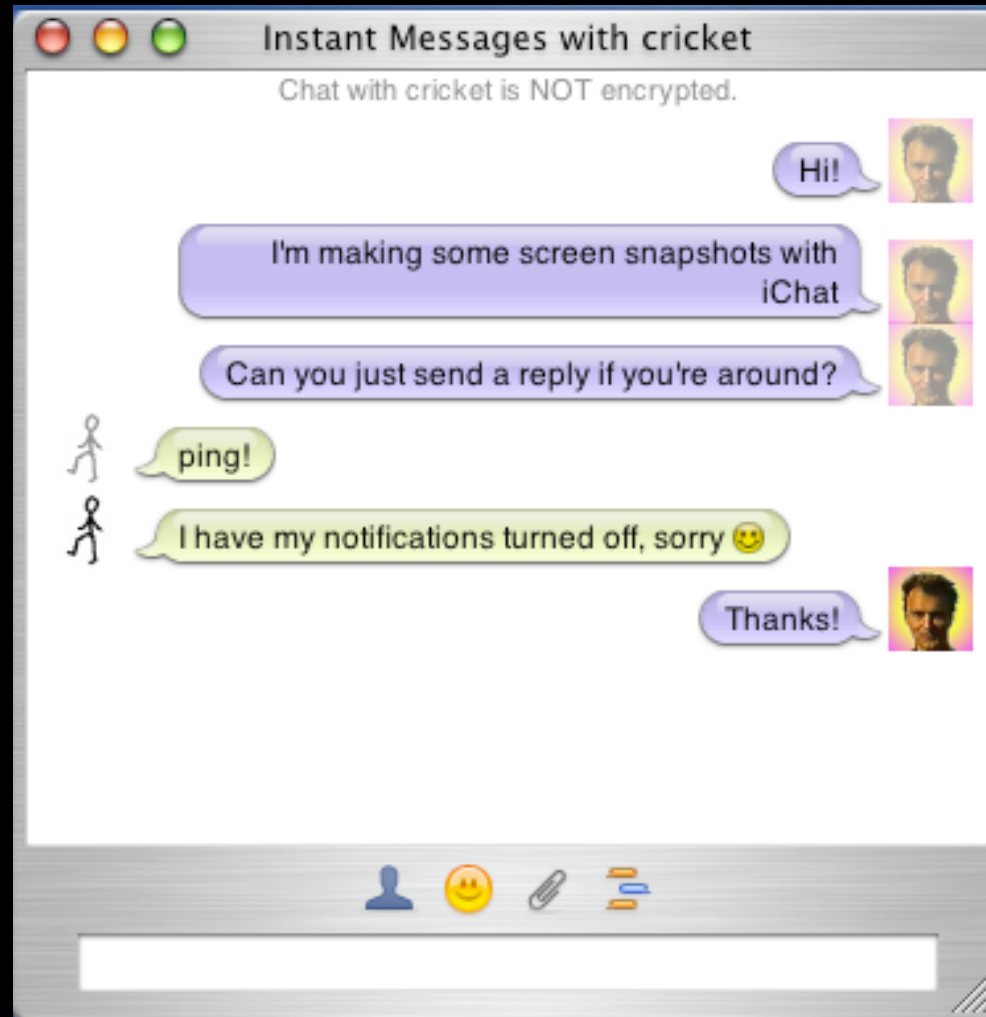
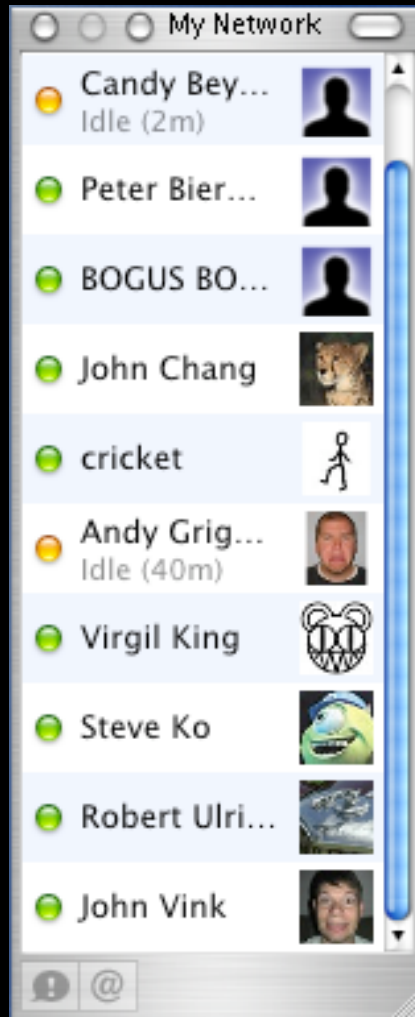
18 messages - 1 deleted

From	Subject	Date Sent	
Chris wa...	Summer homework	07/09/01 1:33 PM	
Chris Ma...	Fwd: Molly's Graduation	07/6/01 2:10 PM	
Shelia Pl...	School Report	07/6/01 2:35 PM	1 i
Apple iC...	Ken Macintosh has sent you an Apple iCard	07/6/01 2:42 PM	1 i
Dan Mac...	Bobby's Catering Brochure	07/6/01 2:59 PM	1 i
Grace Gala	Friday's Agenda	07/9/01 11:17 AM	
Stacy Fuji	Re: Friday's Agenda	07/9/01 11:23 AM	
Chris Ma...	Introducing Trevor Macdonald	07/10/01 3:04 PM	1 i
Chris Ma...	...and one of Paul	07/10/01 4:43 PM	1 i
Stacy Fuji	松山旅行	07/12/01 8:43 AM	1 i
Apple Int...	iTools Update: December 13, 2001	12/13/01 9:18 PM	
Apple Int...	iTools Update: January 24, 2002	01/24/02 8:58 PM	

ちゃんも体に気を付けてくださいね。8月の夏休みには遊びに行きます。

A photograph showing four people in kayaks on a calm body of water. They are wearing life jackets and paddling. In the background, there is a large, dark rock formation with some trees on top, under a cloudy sky.

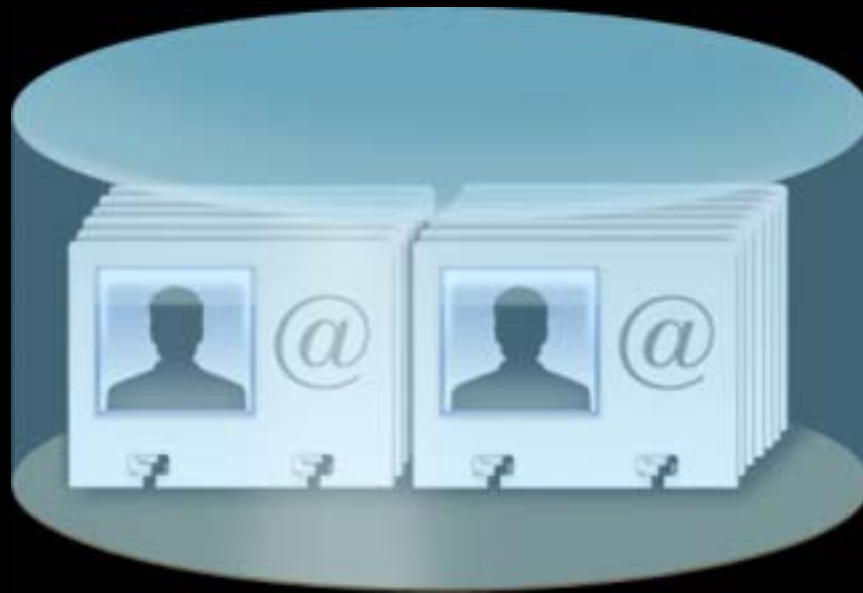
P2P: iChat



P2P: Address Book



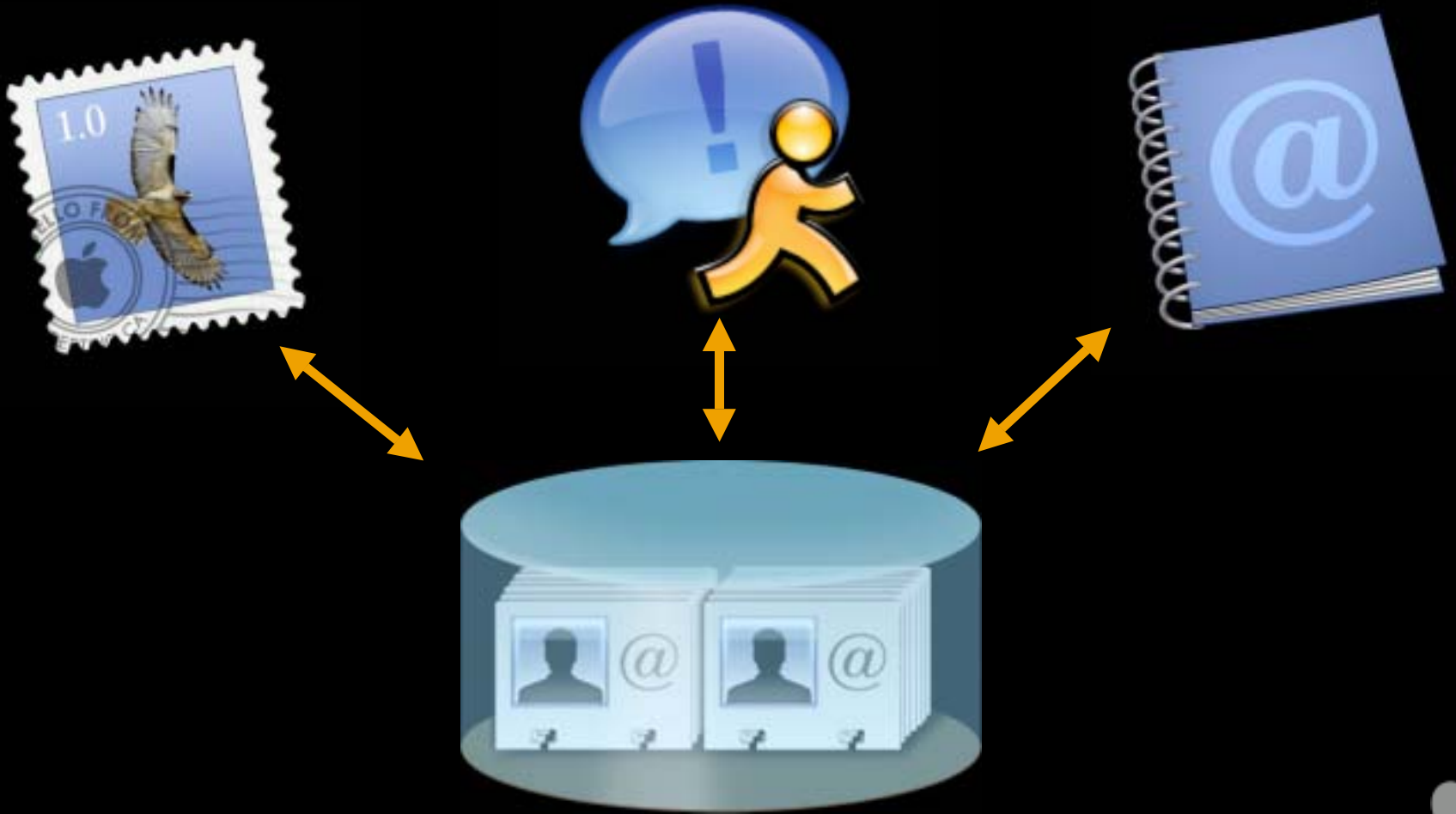
P2P: Address Mgmt



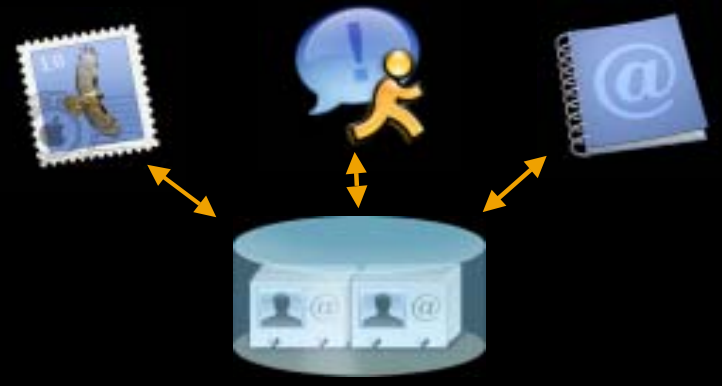
Hub of communication apps



P2P: People to People



Innovation: Thrusts



Innovation

- Leverage our strengths
 - We integrate HW and system SW
 - Great platform to start with
 - Great technologies
 - Ease of use
- Sharing the same vision



Where We Are Headed

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Sends other UNIX boxes to /dev/null.

"My PowerBook G4 is now running every major UNIX app that we had on our Suns, AlphaStations and SGIs – and running them faster."

–Mark Cohen, Ph.D., Professor,
Brain Mapping Center, UCLA

"This new OS has accomplished in a short period of time what others have struggled to do for years: bring a compelling, widely accepted GUI (called Aqua) to UNIX."

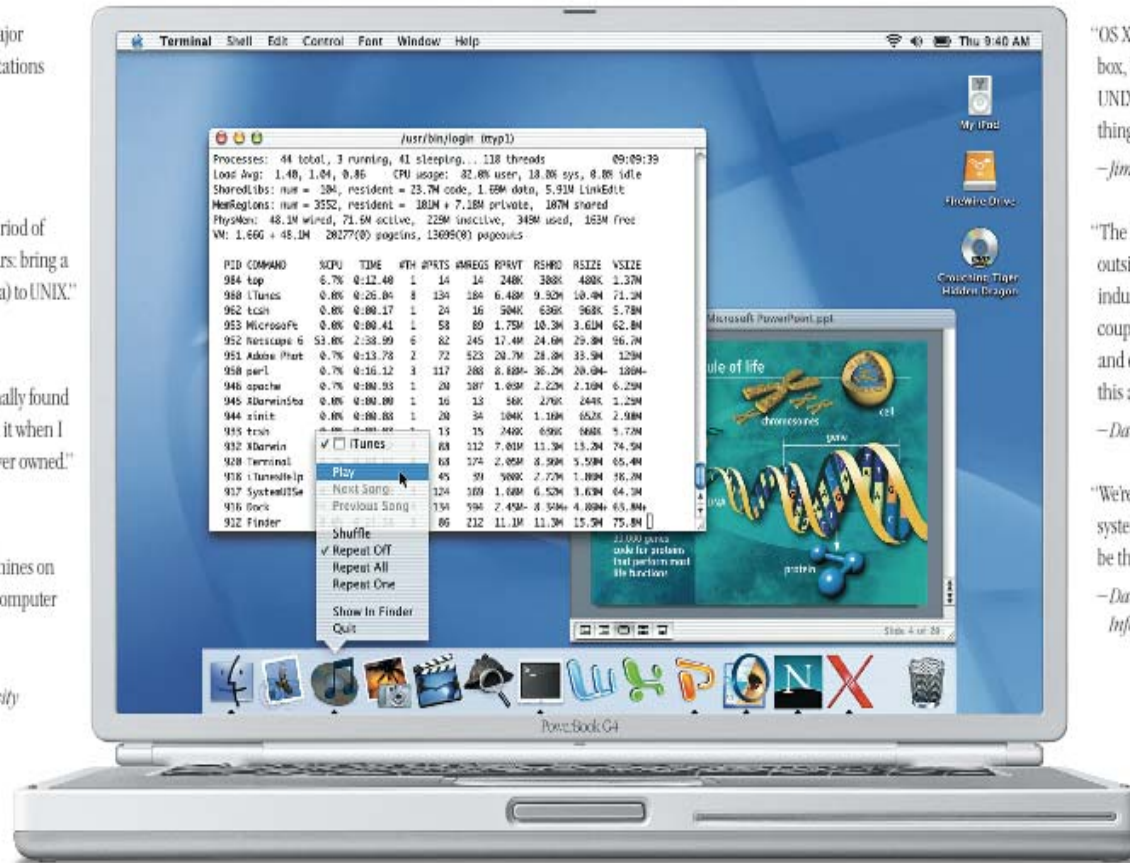
–Tim O'Reilly, O'Reilly Network

"After two-and-a-half years of Linux, I've finally found joy in a UNIX operating system. And I found it when I purchased a Macintosh – the first one I've ever owned!"

–John Hummel Jr., *The Gamers' Press*

"Until Mac OS X came along, I had three machines on my desk. Now with Mac OS X, I can use one computer for writing, coding, research, everything."

–Dr. Michael Cherry, Associate Professor,
Department of Genetics, Stanford University



"OS X has all the power you expect from a UNIX box, but none of the hassle associated with basic UNIX system administration. You can expect things to work and they do."

–Jim Hourihan, *Tweak Films*

"The keys to OS X are that it's UNIX inside and Mac outside. This combination of stability, support for industry standards, and wide developer support coupled with Apple's Aqua graphical user interface and emphasis on graphic performance makes this a truly great operating system."

–David Coursey, *ZDNet AnchorDesk*

"We're old hardcore UNIX hackers, so a BSD-based system is mother's milk. Everything you expect to be there is there, and it works right."

–Dave Weininger, President, *Daylight Chemical Information Systems, Inc.*



A Revolutionary Move

Apple's OS is now Unix-based

- Most solid, proven foundation
- Going mainstream
- Fastest way to many features
- New markets



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- Going mainstream
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What Explains Unix Longevity and Strength?



What Explains Unix Longevity and Strength?

Technology:

- Right low-level abstractions
- Clear separation Kernel / User
- Clear separation non-UI / UI
- Philosophy of small blocks
- Loose integration via scripting



What Explains Unix Longevity and Strength?

But also . . . :

- Server focus => reliability, scalability
- Darwinian evolution of various flavors
- Passion of Linux and FreeBSD
- Open source
- Part of CS curriculum



Mac OS X Relation to Unix?

- Preserve the strength and spirit
- Add value
- Improve base
 - Mobility, power mgmt, drivers, Kernel, VM, real-time,
 - API cleanup
- Only deviate if significant value



Evolution in the Works: Upgrade

- Refresh POSIX APIs
- Updates to FreeBSD 4.4
- IPv6 / IPsec
- Updated: emacs, curses, libc, bash
- Pluggable Authentication Modules
- gcc 3.0
- Terminal UTF-8 support



Evolution in the Works: Add, Integrate

- Add
 - samba
 - python
 - CUPS—printing backend
 - PPTP VPN
- Integrate
 - LDAP
 - Directory Services adoption



Unix—Power

- Revolutionary move
- Now evolving



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Frameworks

Scott Forstall
Director, Frameworks

Frameworks

*Evolving quickly to enable
revolutionary applications*



Jaguar Is One Evolved Cat

- Networking
- Web Services
- Address Book APIs
- International
- Universal Access
- Cocoa and Carbon improvements and integration



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So You Have Got a URL?

**Carbon
URLAccess**

**Cocoa NSURL and
NSURL Handle**



But You Want More!

**Carbon
URLAccess**

**Cocoa NSURL and
NSURL Handle**

Darwin BSD Sockets



Hello CFNetwork

**Carbon
URLAccess**

**Cocoa NSURL and
NSURL Handle**

**Core
Services**

CFNetwork

Darwin

BSD Sockets



CFNetwork

- Power
- Control
- Speed



CFNetwork Gives You Power

- A full HTTP/1.1 engine
- SSL/TLS socket streams
- Net Services APIs
(Rendezvous/ZeroConf)



CFNetwork Gives You Control

- Manipulate HTTP transaction directly
- You control when bytes are read and written
- You choose the threading model
 - Run loop
 - Thread pools
 - Blocking



CFNetwork Gives You Speed



- Fast
- Small footprint
- Lightweight
 - No UI
 - Usable by daemons



CFNetwork: We Use It



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We Are Building on CFNetwork

CFNetwork

BSD Sockets



What Are Web Services?

- Google
- BabelFish
- Weather
- Barnes & Noble
- FedEx
- eBay
- . . . and many others



What Is a Web Service?

- Service
 - Set of functionality
 - Exposed as API
- Web
 - APIs callable over the Web
 - Parameters written as XML
 - Generally packaged as SOAP message
 - Generally transported with HTTP



What Have We Done?

- Support standards
- Mac OS X 10.1
 - Made AppleEvent manager WebService-aware
 - Enabled AppleScript access to WebServices
- Jaguar
 - Added WebServicesCore
 - Client C API for SOAP and XML-RPC



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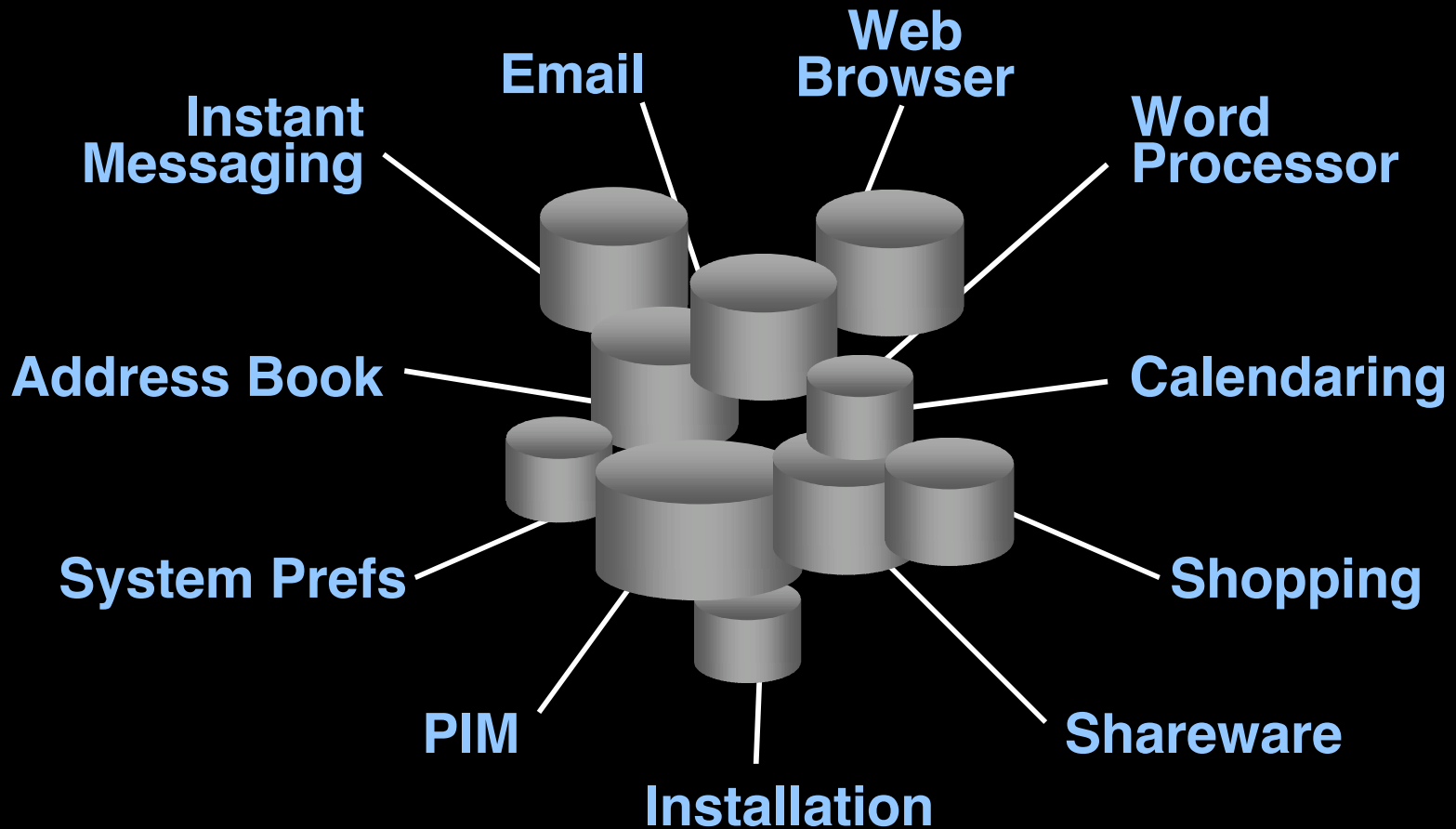
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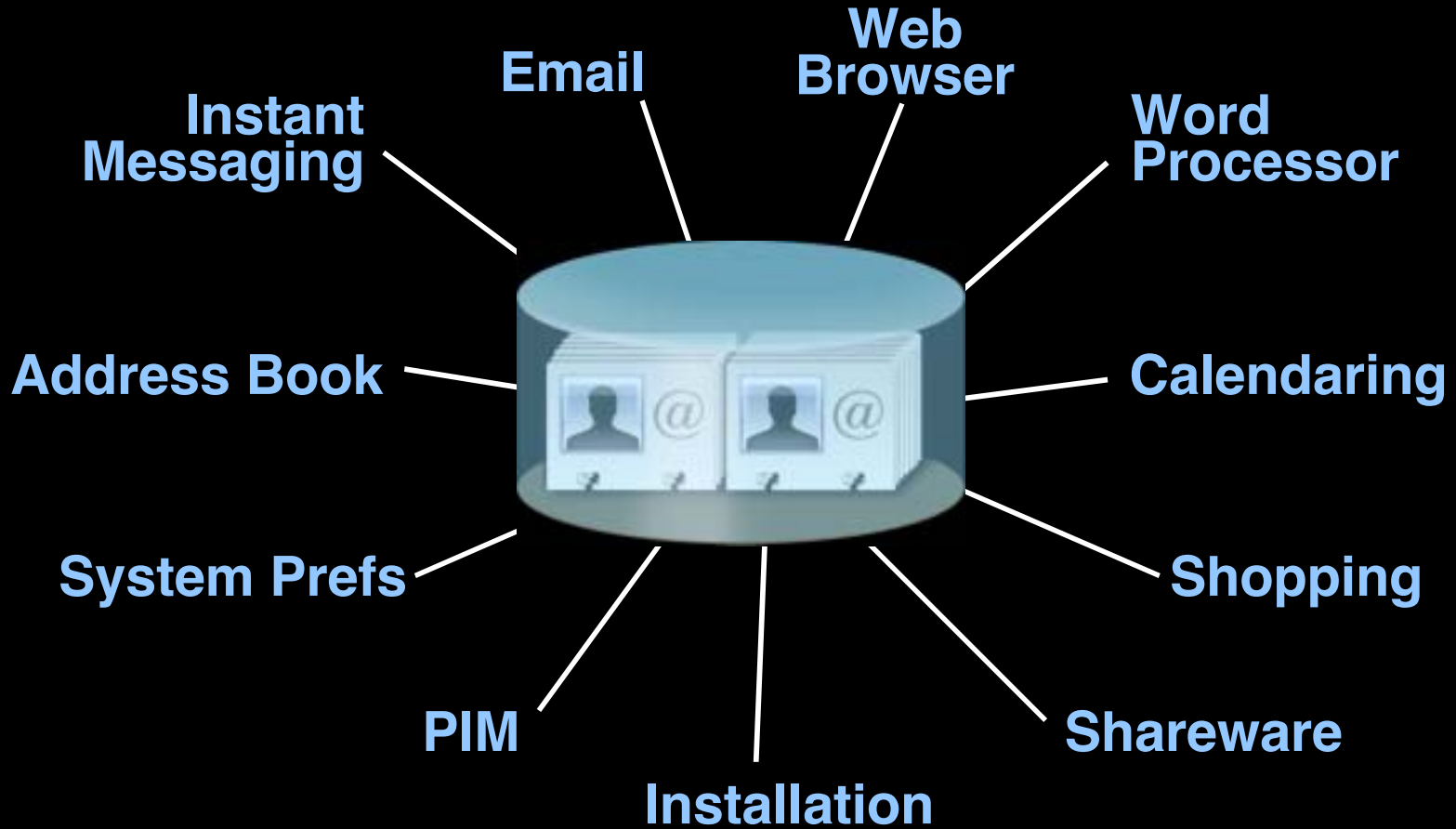


AddressBook





AddressBook APIs



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A Truly International OS

- Single installation in fifteen languages
- Half of Apple revenue comes from outside the U.S.
- Support Unicode standard throughout
 - No garbled text



Added Spell Checking Support

- Deutsch
- Français
- Nederlands
- Svenska
- Português[^] do Brasil
- Español[~]
- Italiano
- Português[^]
- British English



How Do You Spell That?

- Multilingual setting
- Improved spelling algorithm
 - Was dictionary
 - Now algorithm analyzes plurals, apostrophes, stemming, etc.



How Do You Spell That?

- 33% larger English dictionary

*Talentless simpleminded
cockamamie filmmakers prioritized
clunky skateboards...surreal!*



International Text

Better access to characters and glyphs

- Unicode 3.2 support
- Surrogate support
 - Access to one million glyphs
- Improved Japanese input method
- New character palette
 - Dingbats
 - Symbols
 - Extended character set of all fonts



Enabled New Languages

- Cyrillic, Arabic, Hebrew, Thai, Devanagari, Gurmukhi, Gujarati, Icelandic, Turkish, Greek, Croatian, Romanian, Slovenian



Hawaiian

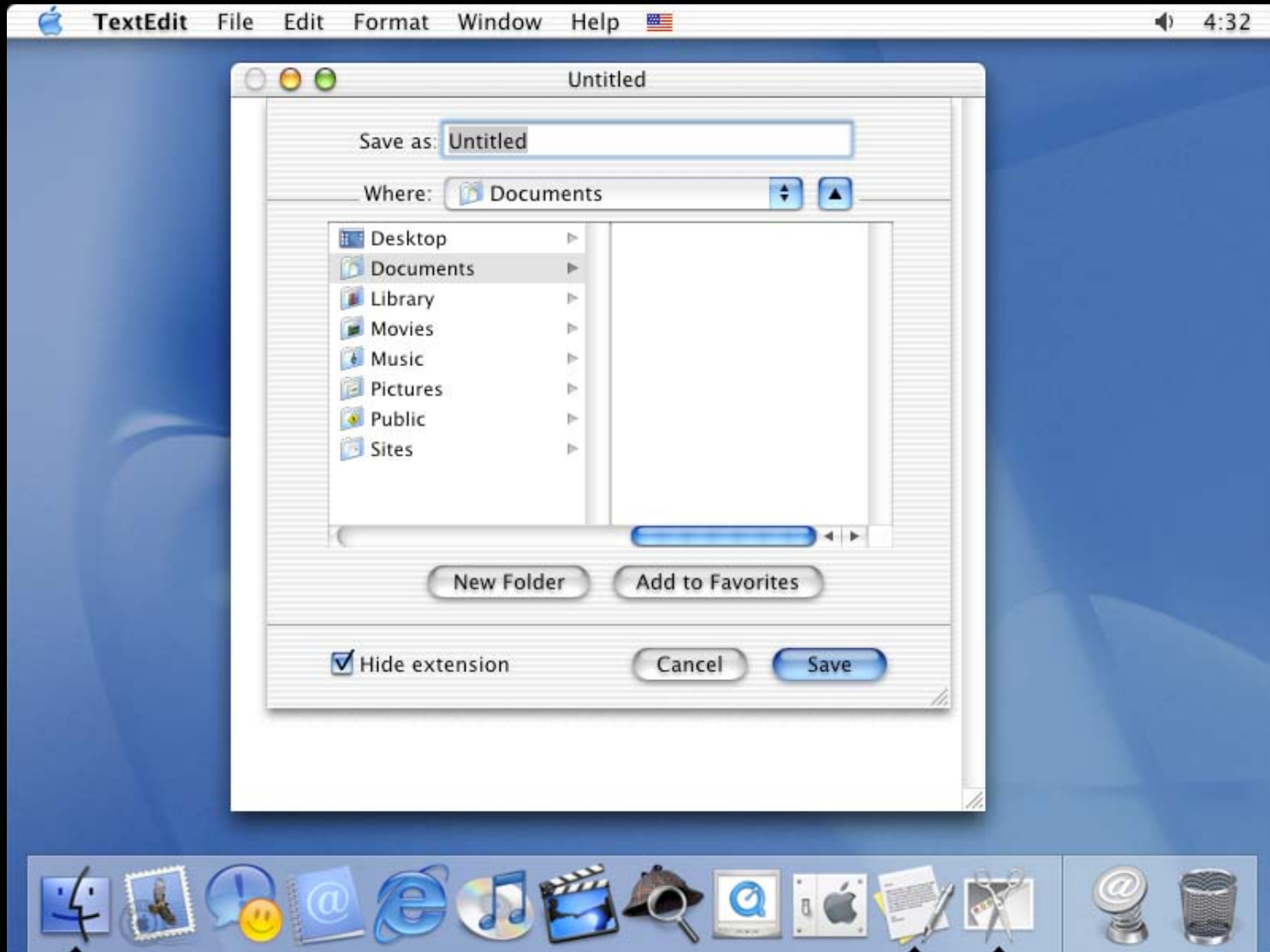


Enabled New Languages

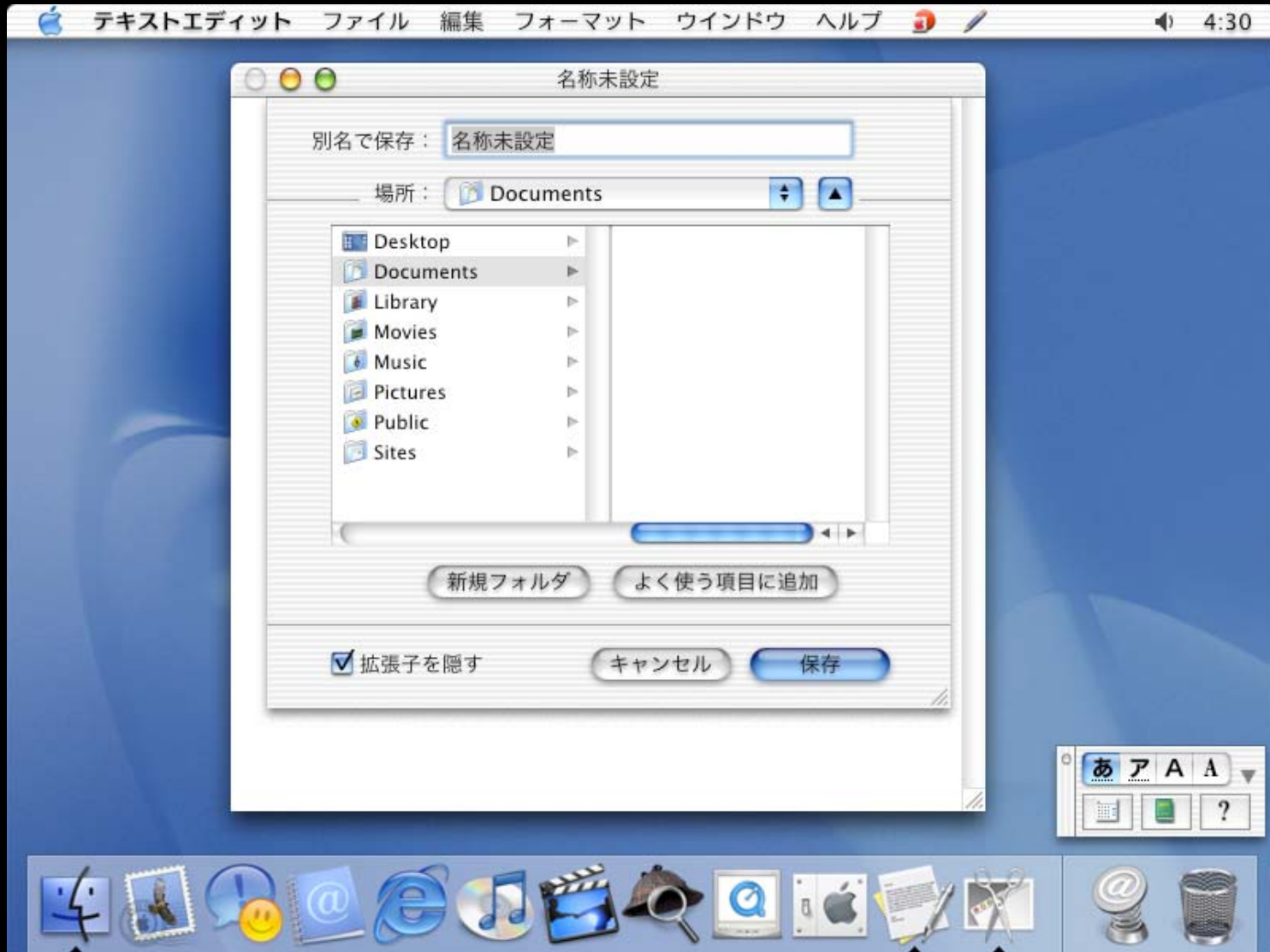
- Cyrillic, Arabic, Hebrew, Thai, Devanagari, Gurmukhi, Gujarati, Icelandic, Turkish, Greek, Croatian, Romanian, Slovenian, Hawaiian
- Bi-di support



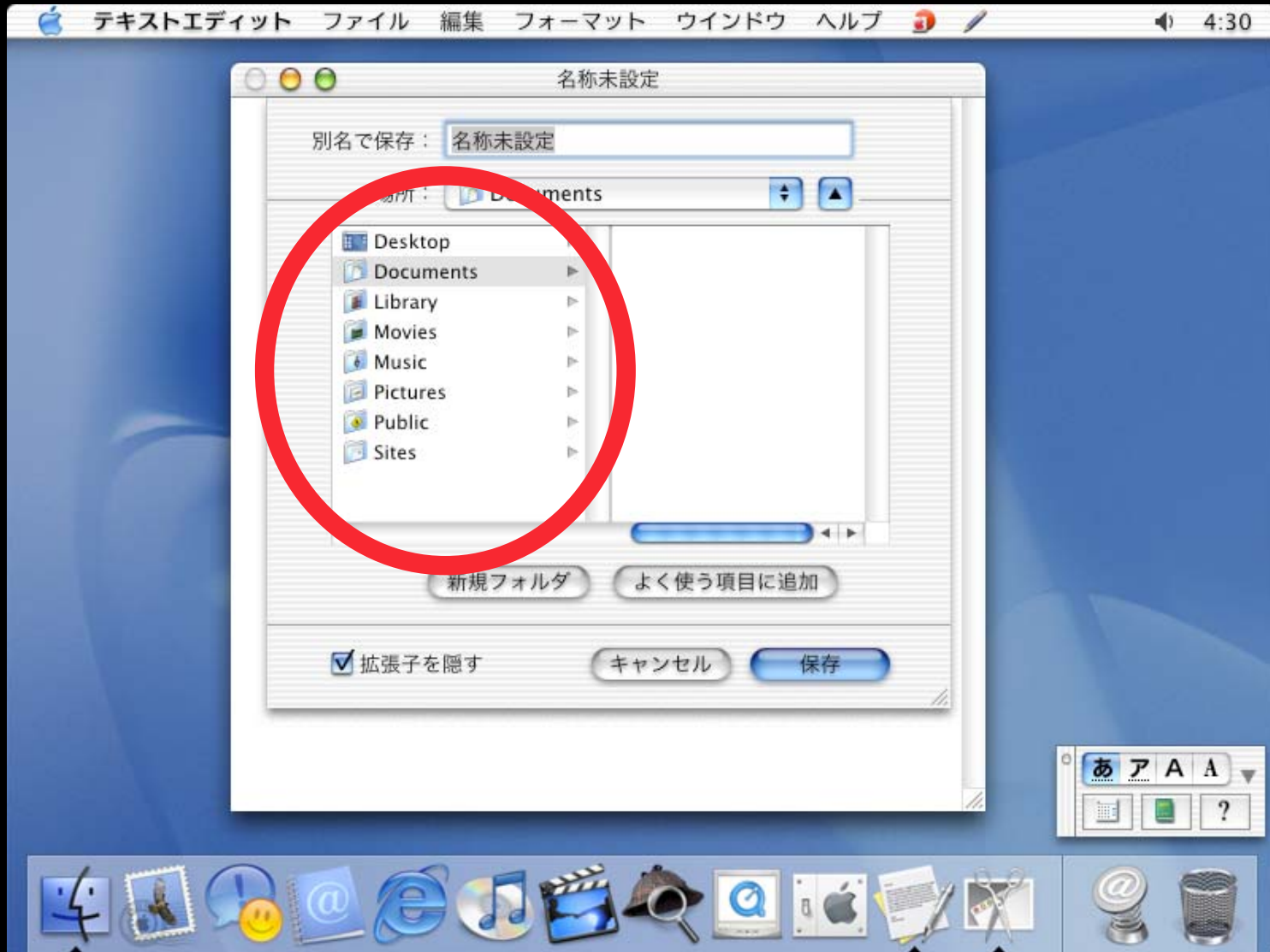
Mac OS X 10.1 in English



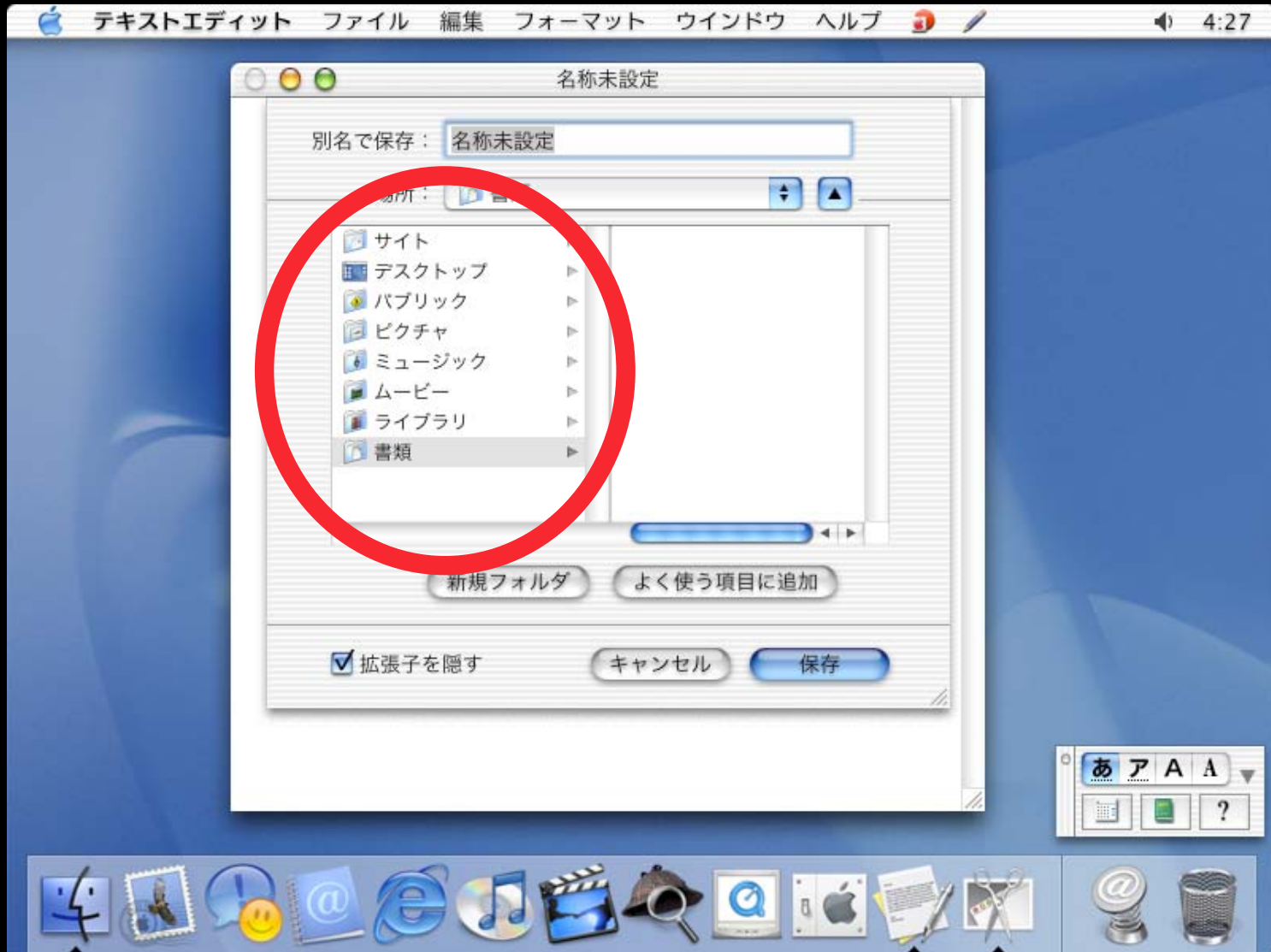
Mac OS X 10.1 in Japanese



Mac OS X 10.1 in Japanese



Jaguar in Japanese



Localized View of the Filesystem

- Multiple simultaneous localizations (SBML)
- Compatible with previous installations
- Localized view, not localized filesystem
- Minimal performance impact
- User changes override localizations



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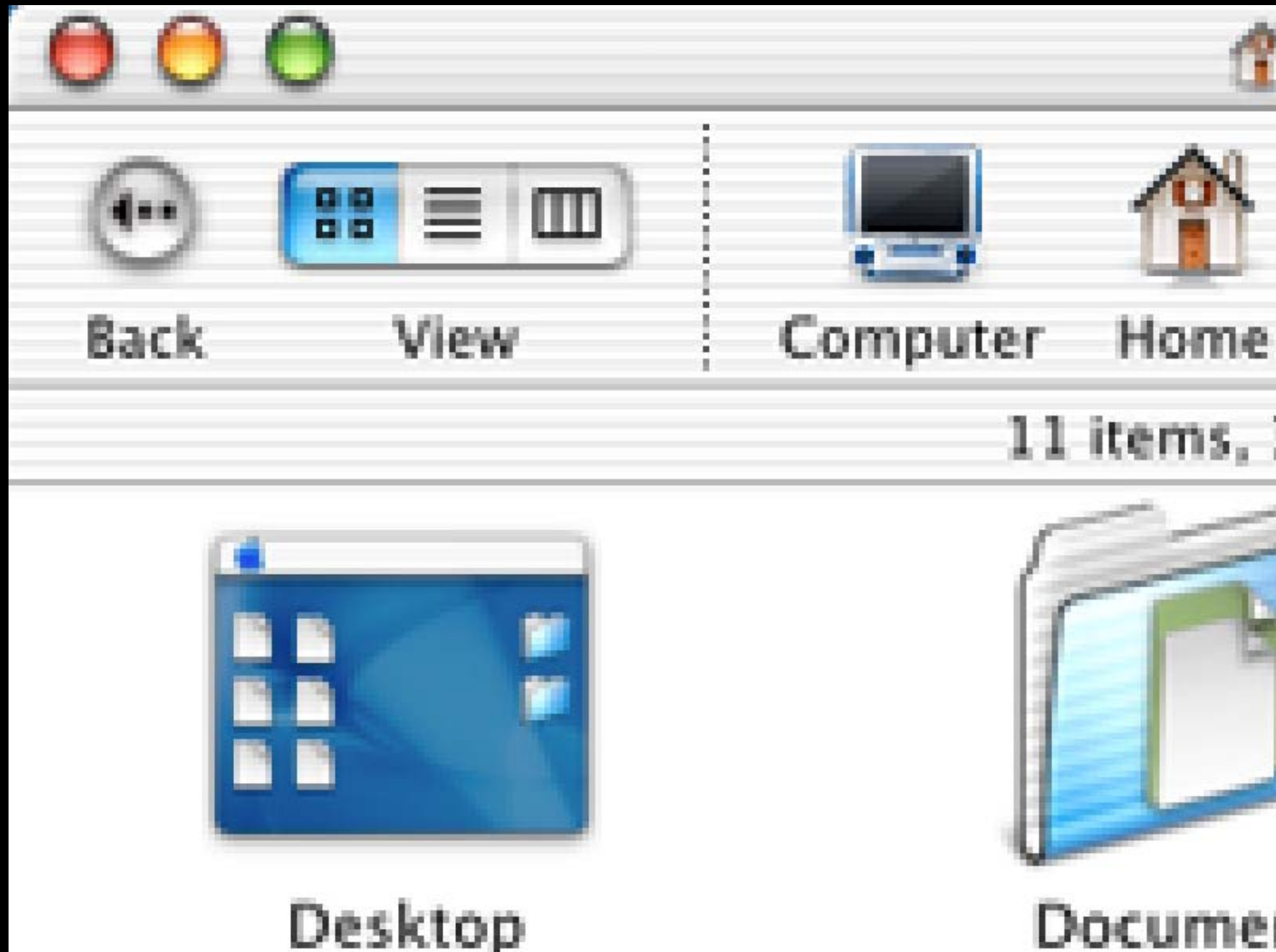
Universal Access



- Enable all users to enjoy Mac OS X
- Most comes for free
- Minimal developer requirements for some features



Zoom



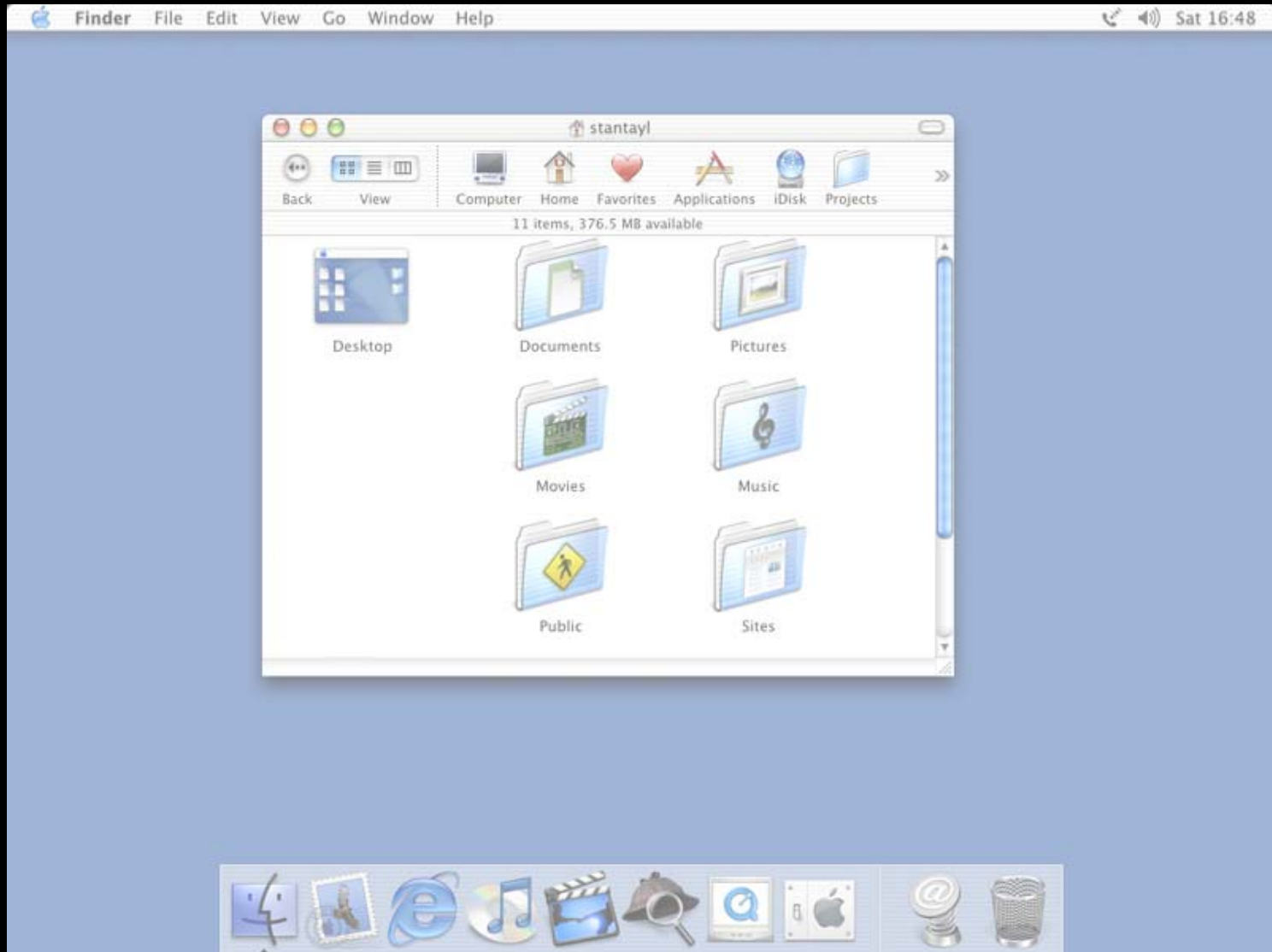
Inversion



Visible Beep



Visible Beep



Visible Beep



Sticky Keys



Sticky Keys



Sticky Keys



Sticky Keys



Slow Keys



Mouse Keys



Your Job for Accessibility

- Keyboard navigation and other assistive APIs
 - Automatic for standard controls
 - Carbon: customize with CarbonEvents
 - Cocoa: customize by overriding methods and implementing informal protocol
 - Interface Builder support
- Enables screen readers



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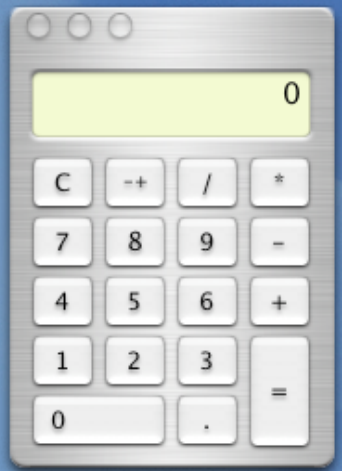
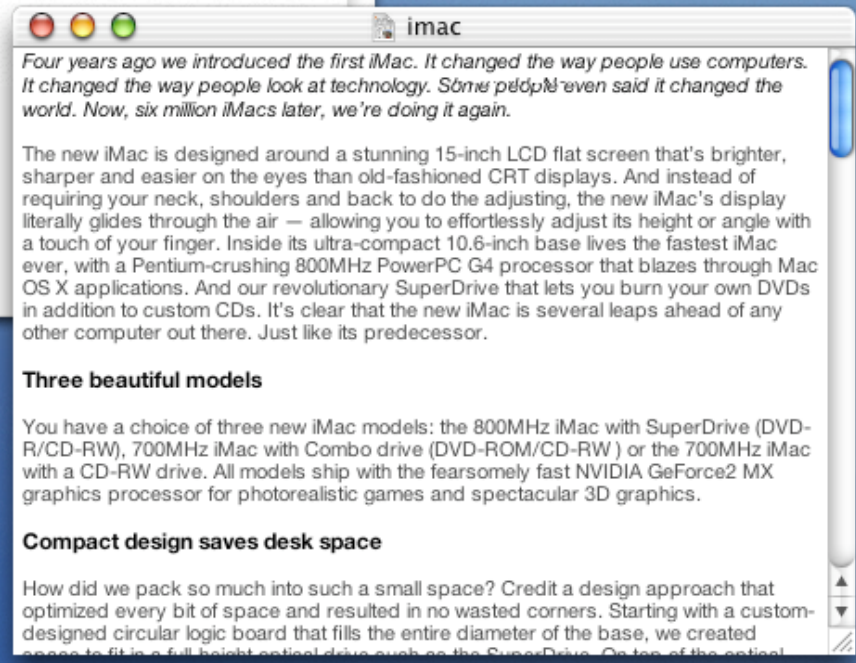
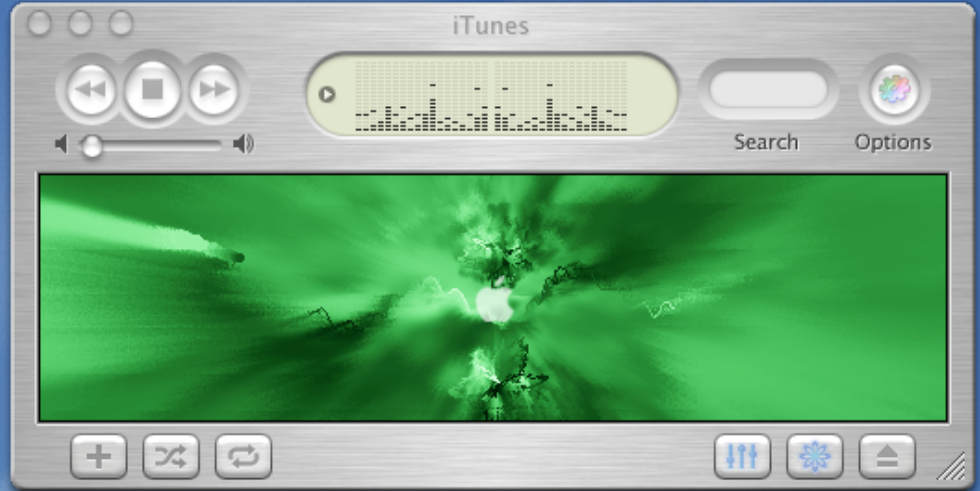
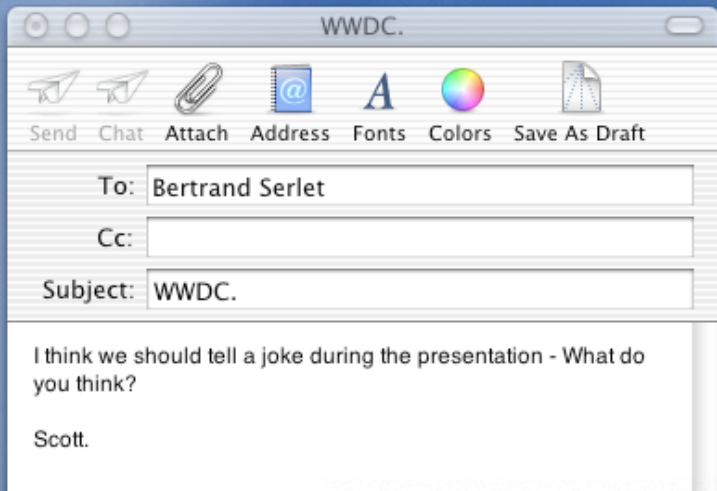
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- Cocoa and Carbon improvements and integration

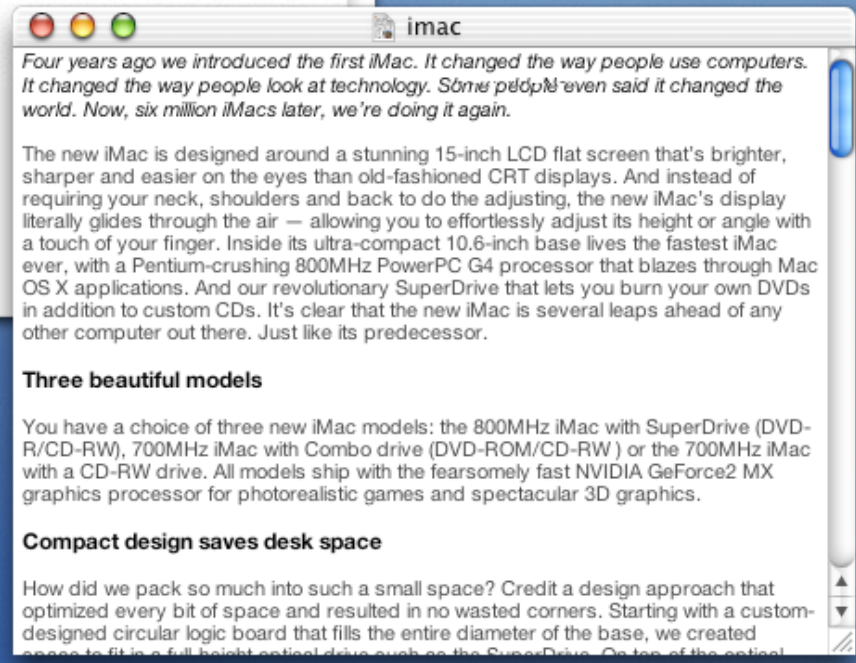
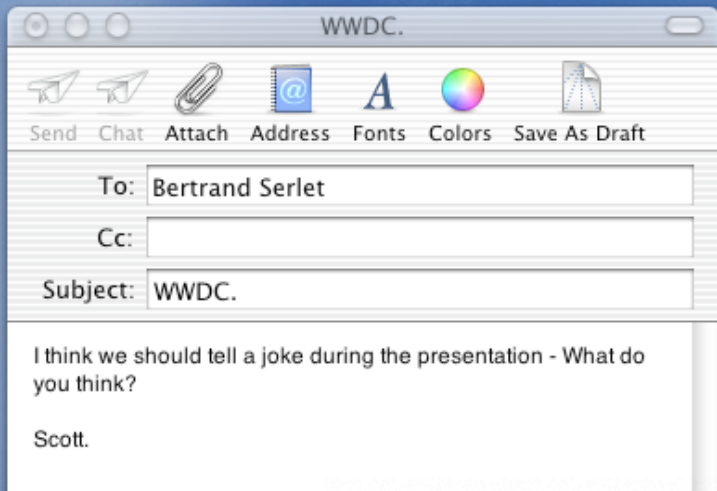


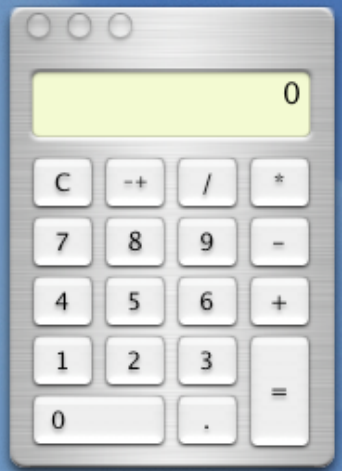
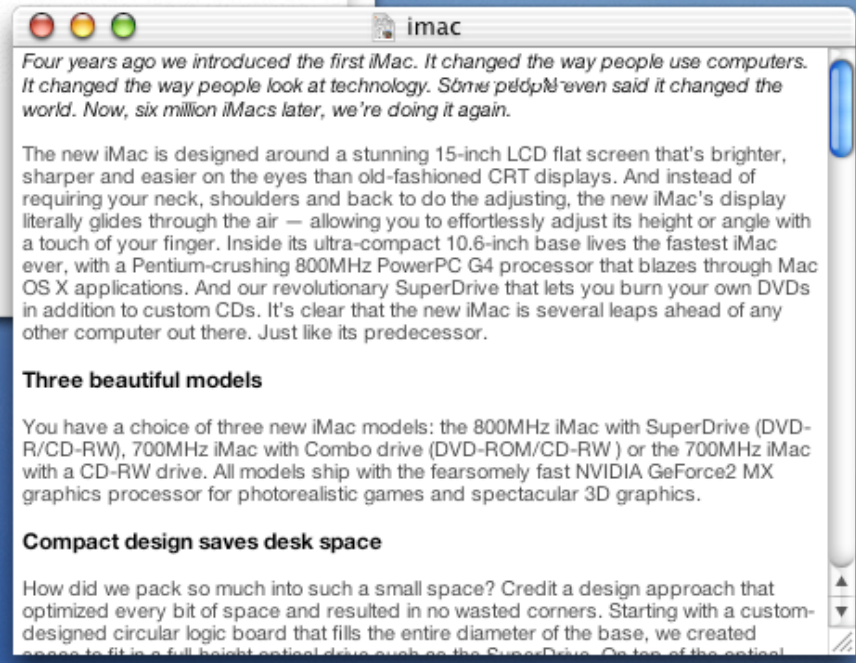
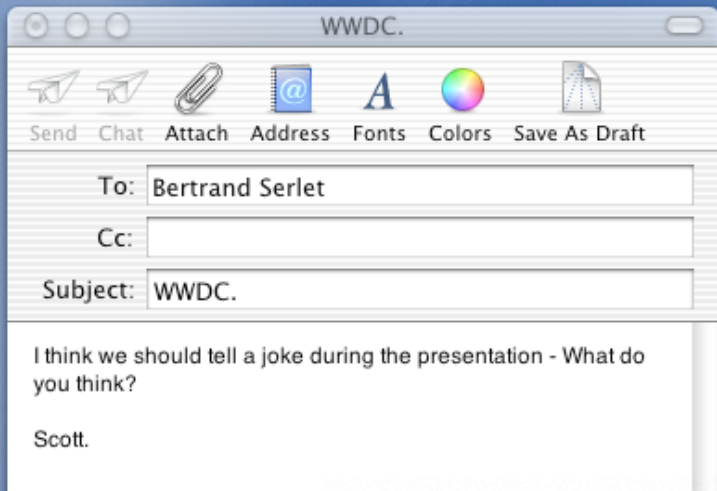
Quiz Time

- How can you spot:
 - An iApp?
 - A Cocoa app?
 - A Carbon app?









Movie Finder

How Many Stars? 5

Search

Searching...


Name	Director	MPAA Rating
Heat	Michael Mann	PG
Alien	Ridley Scott	R
Fifth Element	Luc Besson	PG-13

Kids Comedy Drama Sci-Fi Action

Movie Finder


How Many Stars? 5


Search

Searching... 

Name	Director	MPAA Rating
Heat	Michael Mann	PG
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Movie Finder

How Many Stars? 5 

Searching... 

Name	Director	MPAA Rating
Heat	Michael Mann	PG
Alien	Ridley Scott	R
Fifth Element	Luc Besson	PG-13

Action
Sci-Fi
Drama
Comedy
Kids

Movie Finder

How Many Stars? 5

Search

Searching...

Name	Director	MPAA Rating
Heat	Michael Mann	PG
Alien	Ridley Scott	R
Fifth Element	Luc Besson	PG-13

The image shows a vertical sidebar on the left side of the window, enclosed in a red rounded rectangle. It contains five buttons labeled from top to bottom: Action, Sci-Fi, Drama, Comedy, and Kids. The 'Action' button is currently selected and highlighted in blue.

Movie Finder

How Many Stars? 5

Search

Searching...


Name	Director	MPAA Rating
Heat	Michael Mann	PG
Alien	Ridley Scott	R
Fifth Element	Luc Besson	PG-13

Toy Box

Zoom In Zoom Out Rotate Left Rotate Right Backward Forward

Cars Truck Boats Airplanes

Manufacturer: Audi Model: TTi



Options Save...


The image shows a classic Mac OS X window titled "Toy Box". At the top is a menu bar with "Toy Box", "File", "Edit", and "Help". The window's title bar includes a close button. Below the title bar is a toolbar with icons for "Zoom In", "Zoom Out", "Rotate Left", "Rotate Right", "Backward", and "Forward". A category bar contains buttons for "Cars", "Truck", "Boats", and "Airplanes", with "Cars" selected. Below this are two dropdown menus: "Manufacturer: Audi" and "Model: TTi". The main area features a 3D rendering of a silver Audi TTi sports car from a rear three-quarter perspective. At the bottom right are two buttons: "Options" and "Save...".

Toy Box

Zoom In Zoom Out Rotate Left Rotate Right Backward Forward

Cars Truck Boats Airplanes

Manufacturer: Audi Model: TTi



Options Save...


The image shows a software window titled "Toy Box" with a red border around the top toolbar. The toolbar contains six icons: a magnifying glass with a plus sign for "Zoom In", a magnifying glass with a minus sign for "Zoom Out", a circular arrow for "Rotate Left", a circular arrow for "Rotate Right", a left-pointing arrow for "Backward", and a right-pointing arrow for "Forward". Below the toolbar are four category buttons: "Cars" (selected), "Truck", "Boats", and "Airplanes". Underneath are two dropdown menus: "Manufacturer: Audi" and "Model: TTi". A central image displays a silver Audi TTi from a rear three-quarter perspective. At the bottom right are two buttons: "Options" and "Save..."

Toy Box

Zoom In Zoom Out Rotate Left Rotate Right Backward Forward

Cars Truck Boats Airplanes

Manufacturer: Audi Model: TTi



Options Save...

The image shows a software window titled "Toy Box" with a menu bar (File, Edit, Help) and a system clock (Fri 7:51 PM). The window contains a toolbar with icons for zooming and rotating, and buttons for "Backward" and "Forward". Below the toolbar are category buttons for "Cars", "Truck", "Boats", and "Airplanes". A red rectangle highlights a form with two dropdown menus: "Manufacturer: Audi" and "Model: TTi". Below the form is a 3D rendering of a silver Audi TTi car. At the bottom right are "Options" and "Save..." buttons.

Add these options:

- Sport Wheels
- Sunroof
- Turbocharged
- Stops on a Dime
- Hugs the Corners

Transmission:

- Manual 6 Speed
- Automatic

Change Color


Change Font

Toy Box

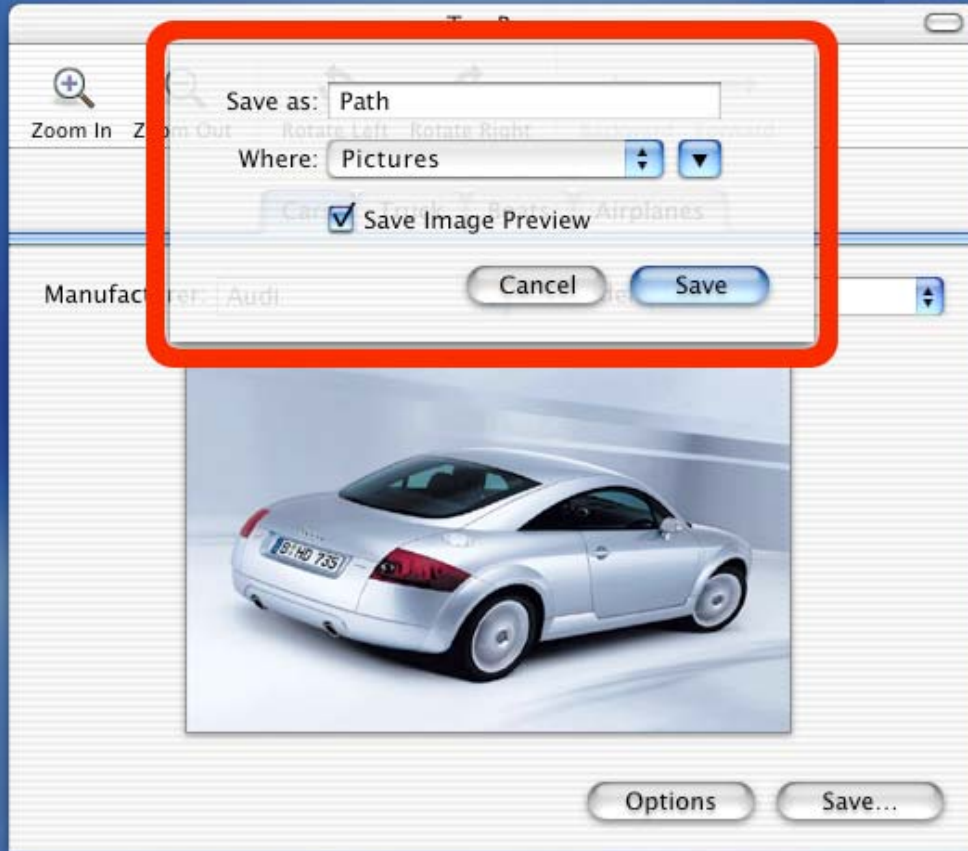
Zoom In Zoom Out Rotate Left Rotate Right Backward Forward

Cars Truck Boats Airplanes

Manufacturer: Audi Model: TTi



Options Save...



- About Toy Box Preferences...
- Services** ▶
- Hide Toy Box ⌘H
- Hide Others
- Show All
- Quit TextEdit ⌘Q


- Demo Assistant ▶
- Disk Copy ▶
- Finder ▶
- Grab ▶
- Mail ▶
- Make new sticky note. ⌘Y
- Network Utility ▶
- Speech ▶
- Summarize
- TextEdit ▶
- View in JavaBrowser ⌘J

Toy Box

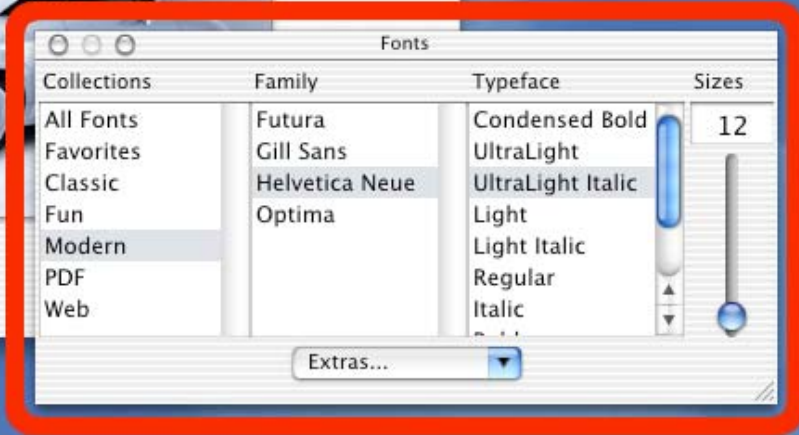
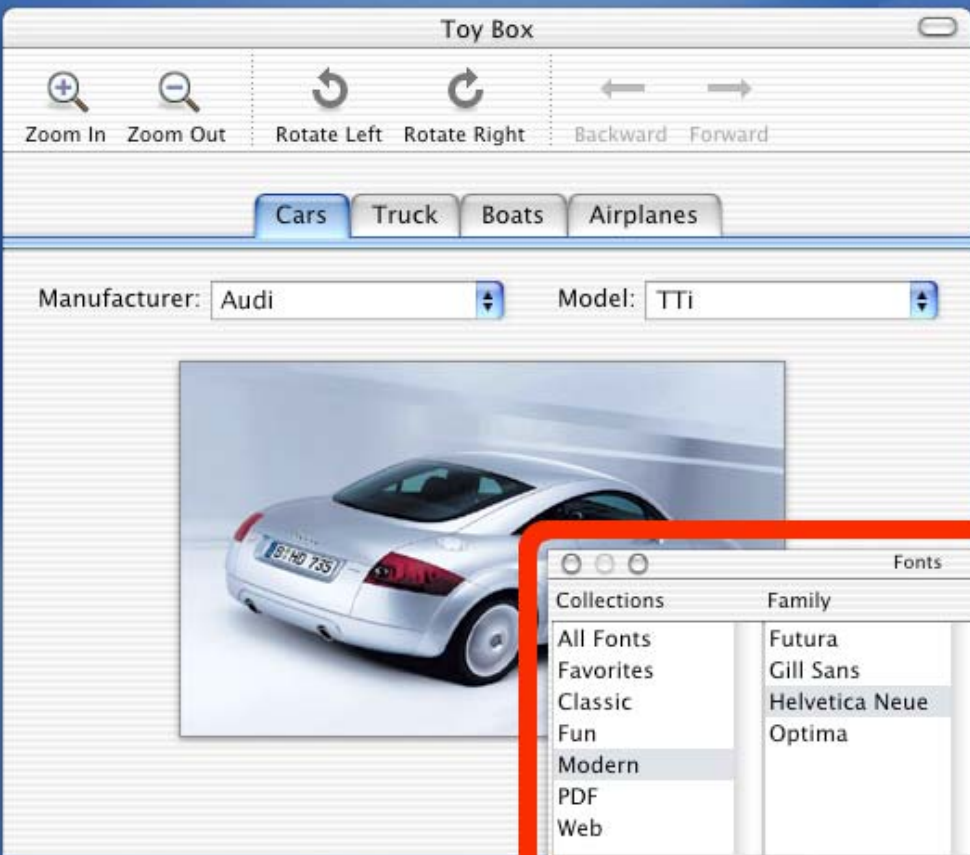
Rotate Right Backward Forward

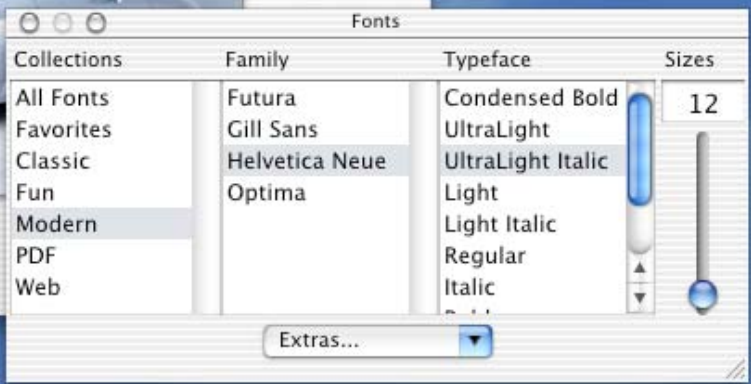
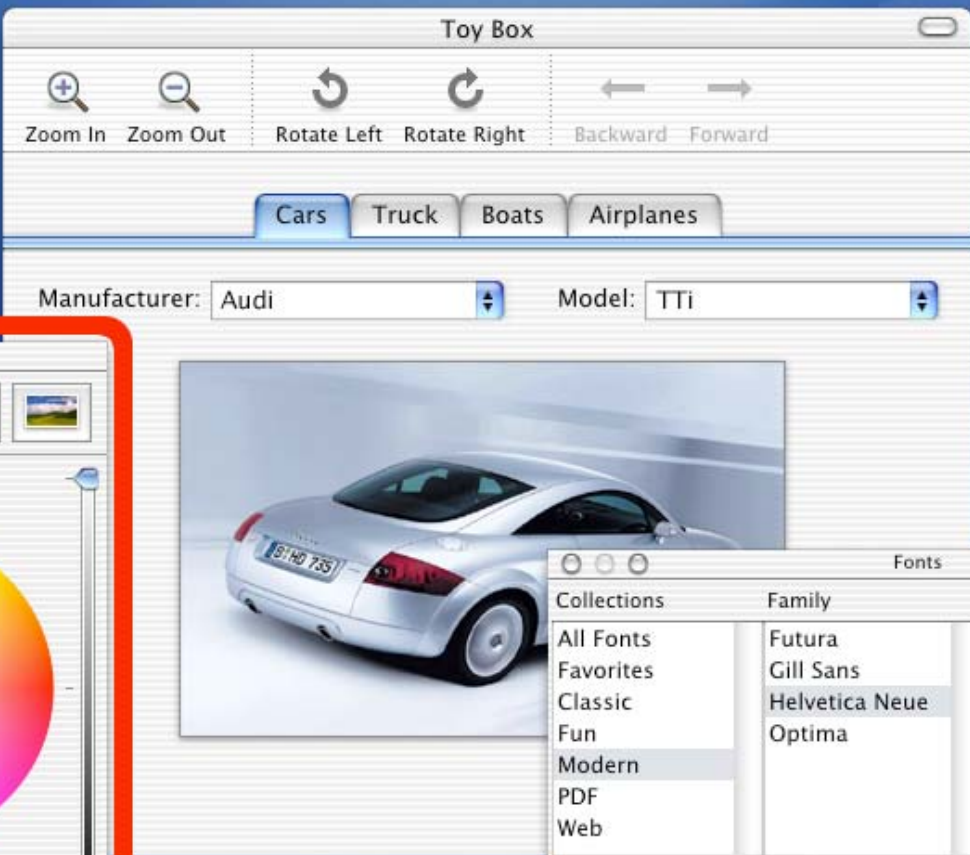
Truck Boats Airplanes

Manufacturer: Audi Model: TTi



Options Save...





Carbon and Cocoa Integration

- We have been doing it all along
- Now we are opening it up to you



imac

Printer: 17.202.20.180

Presets: Standard

Copies & Pages

Copies: 1 Collated

Pages: All
 From: 1 to: 1

? Preview Cancel Print

Four years
technology

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imac

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imac

Printer: 17.202.20.180


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Copies & Pages

Copies: 1 Collated

Pages: All From: 1 to: 1

? Preview Cancel Print



The image shows a print dialog box for an iMac. The printer is set to 17.202.20.180 with the Standard preset. The 'Copies & Pages' section is expanded, showing 1 copy, collated, and all pages. The background is a faded image of a man standing next to an iMac G4 computer.

imac

Printer: 17.202.20.180


Presets: Standard

Copies & Pages

Copies: 1 Collated

Pages: All From: 1 to: 1

Preview Cancel Print



imac

Printer: 17.202.20.180

Presets: Standard

Copies & Pages

Copies: 1 Collated

Pages: All From: 1 to: 1

? Preview Cancel Print

Four years
technology

The new iMac
old-fashion
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imac

Printer: 17.202.20.180


Presets: Standard

Copies & Pages

Copies: 1 Collated

Pages: All From: 1 to: 1

? Preview Cancel Print



The background image shows a man in a light-colored jacket standing next to an iMac G4 computer. The computer is a flat-panel design with a silver neck and a white hemispherical base. The scene is set outdoors, possibly in a city street, with buildings visible in the background. The image is faded and serves as a background for the print dialog box.

Four years
technology

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Printer: 17.202.20.180

Presets: Standard

Copies & Pages:

Copies: 1 Collated

Pages: All From: 1 to: 1

Preview Cancel Print

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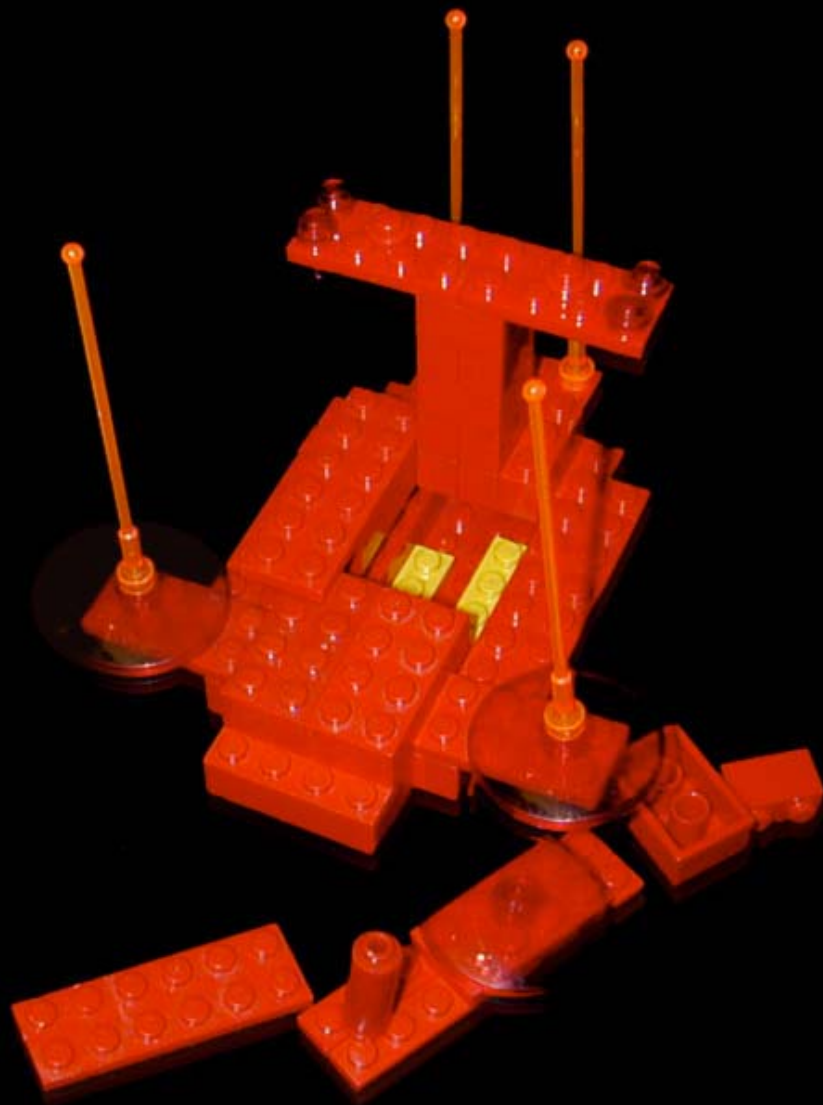
Oh the Endless Possibilities

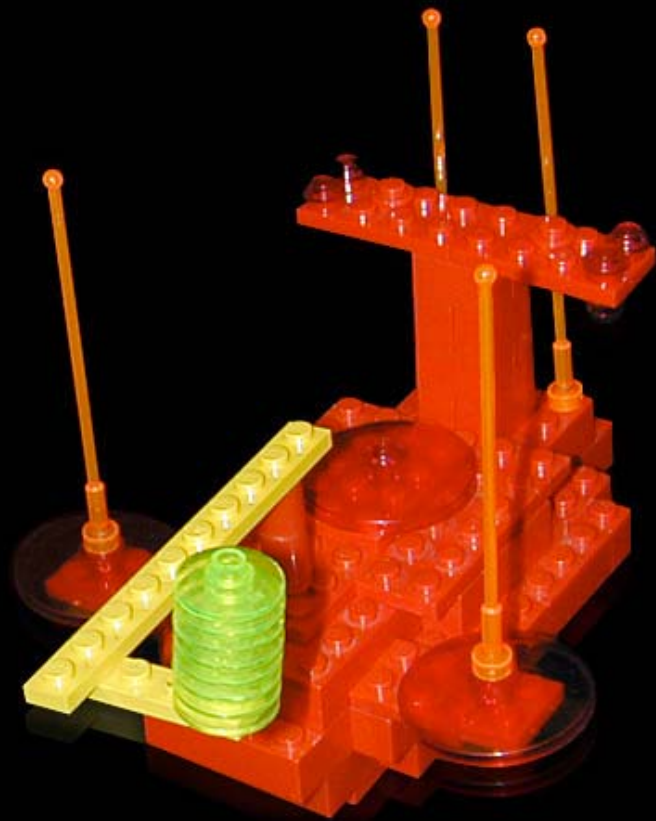
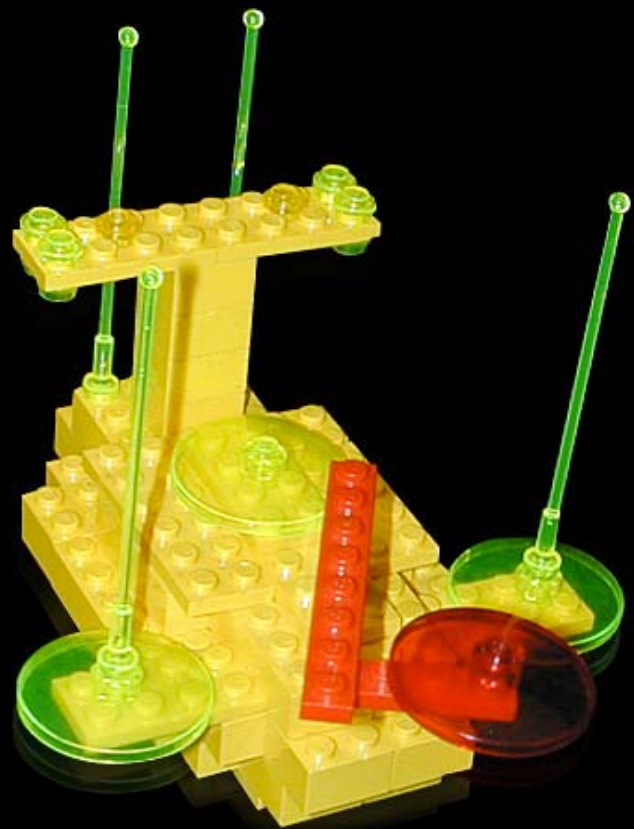


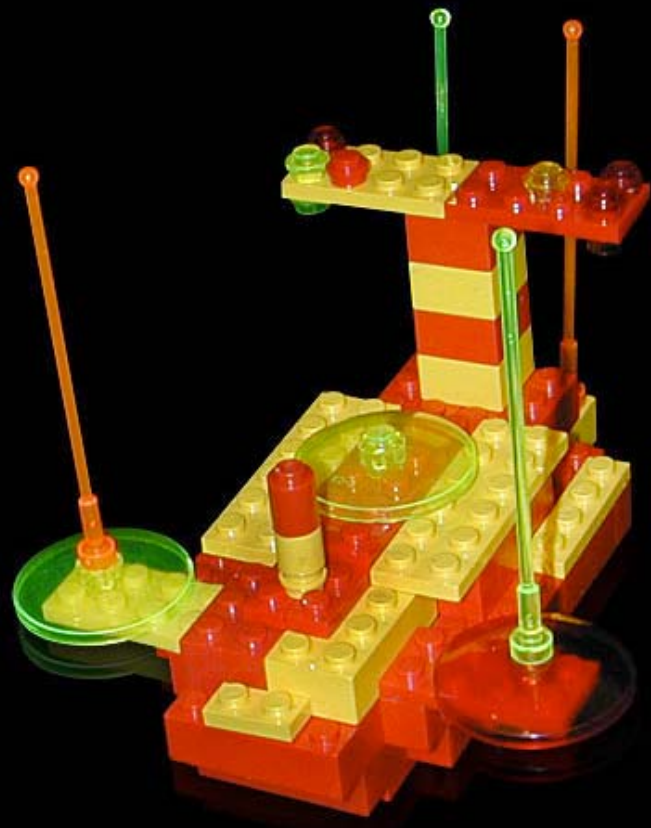
- Use Cocoa from Carbon and vice versa
- Non-UI integration supported since 10.1
 - Resource Manager
 - Spell Checker
- Window-based UI integration new for Jaguar
 - Host Cocoa plug-ins











Documentation

- Integrating Carbon and Cocoa in Your Application

ADC Member Site > Download Software
connect.apple.com





Demo

Where We Are Headed

- 1 Evolution
- 2 Revolution
- 3 Unix
- 4 Frameworks



Where We Are Headed

- 1 Evolution
- 2 Revolution
- 3 Unix
- 4 Frameworks



Jaguar Pre-Release





WWDC2002



WWDC2002

 **WWDC2002**